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NATIONAL DAM INSPECTION PROGRAM. DEER VALLEY LAKE DAM (NDS I.D.--ETC(U)
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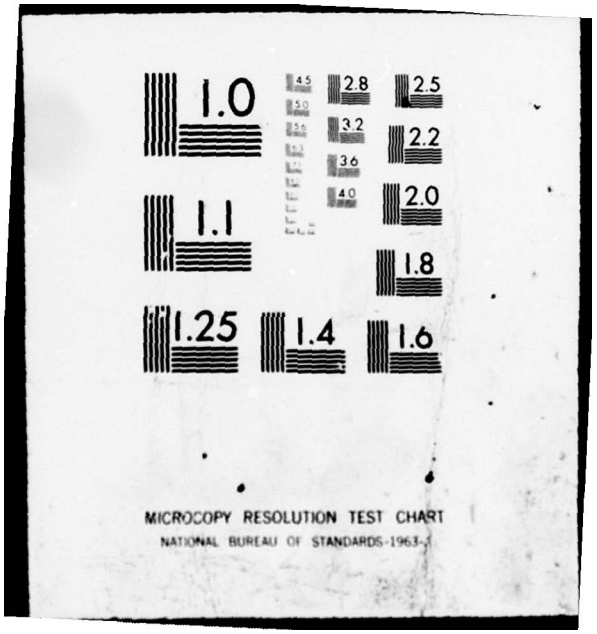
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OHIO RIVER BASIN
COVE RUN, SOMERSET COUNTY

PENNSYLVANIA

DEER VALLEY LAKE DAM

NDS I.D. No. PA - 00230
PENNDER I.D. No. 56 - 76

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

PREPARED BY

GAI CONSULTANTS, INC.
570 BEATTY ROAD
MONROEVILLE, PENNSYLVANIA 15146

AUGUST 1979

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topograhic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

ABSTRACT

Deer Valley Lake Dam: NDI I. D. NO. PA-00230

Owner: Y.M.C.A. of Pittsburgh

State Located: Pennsylvania (PennDER I.D. No. 56-76)

County Located: Somerset

Stream: Cove Run

Inspection Date: 11 July 1979

Inspection Team: GAI Consultants, Inc.
570 Beatty Road
Monroeville, Pennsylvania 15146

Based on a visual inspection, operational history, and available engineering data, the dam is considered to be in fair condition. Structural deficiencies noted during the inspection include an inoperable drawdown mechanism, seepage and ponded conditions at the downstream toe, dense overgrowth (bushes, weeds, small trees) on the downstream slope, and minor concrete deterioration in the spillway.

The size classification of the facility is intermediate and its hazard classification is considered to be significant. In accordance with recommended guidelines, the Spillway Design Flood (SDF) for this facility is 1/2 the Probable Maximum Flood (PMF). Results of the hydrologic and hydraulic analysis indicate that the facility can accommodate approximately 32 percent of the PMF and/or 64 percent of the SDF (1/2 PMF). Thus, the spillway system is considered inadequate, but not seriously inadequate. It is, therefore, recommended that the owner:

a. Have the facility studied by a registered professional engineer experienced in the hydraulics and hydrology of dams and take the necessary remedial measures to make the spillway system hydraulically adequate.

b. Clear the dense overgrowth from the downstream slope, particularly near the toe, to enable expedient inspection and evaluation of the toe area.

c. Take remedial measures to drain the ponded water along the downstream toe and install a weir or weirs under the direction of a registered professional engineer, experienced in the design of earth dams, to measure and evaluate the seepage conditions.

d. Have the drawdown mechanism inspected to assess the condition of the slide gate and control rod and take remedial measures to restore the operability of the system.

e. Develop a formal manual of operation and maintenance to insure the proper care and utilization of the facility. Included in the manual should be provisions for removing the fish screen from the spillway crest and securing or removing the temporary docks at the entrance to the spillway during periods of large flow.

f. Develop an emergency warning system to notify downstream inhabitants in the event emergency conditions develop. Included in the plan should be provisions for around-the-clock surveillance during periods of unusually heavy precipitation.

(6) National Dam Inspection Program. Deer Valley Lake Dam (NDS I.D. Number PA-00230, PennDer I.D. Number 56-76), Ohio River Basin, Cove Run, Somerset County, Pennsylvania. Phase I Inspection Report,

(10) Bernard M. Mihalcin

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(15) DACW31-79-C-0013

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GAI Consultants, Inc.

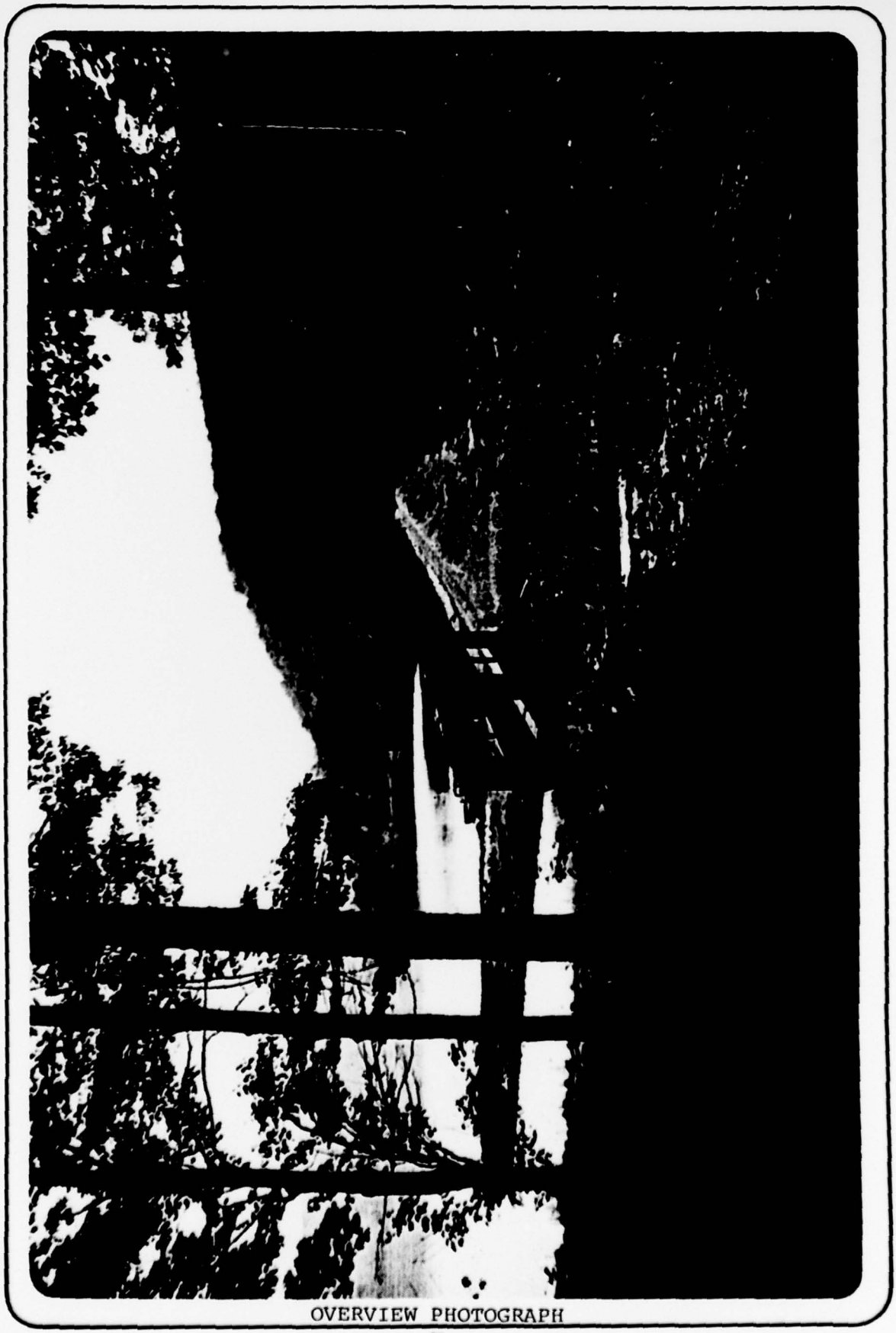
Bernard M. Mihalcin, P.E.

Date 27 August 1979

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

Date 5 Sep 79



OVERVIEW PHOTOGRAPH

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
DEER VALLEY LAKE DAM
NDI# PA-00230, PENNDER# 56-76

SECTION 1
GENERAL INFORMATION

1.0 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

1.1 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Deer Valley Lake Dam is an earth embankment (with concrete corewall) approximately 800 feet long (including spillway) with a maximum measured height of 22 feet. The facility is equipped with a drawdown mechanism consisting of a 12-inch diameter pipe (material unknown) with a slide gate mounted on the inlet that is operated from the embankment crest. The spillway is a concrete chute with an ogee-like crest located at the right abutment. A covered wooden bridge supported by steel beams spans the spillway.

b. Location. Deer Valley Lake Dam is located on Cove Run near the western base of Mt. Davis, in Elklick Township, Somerset County, Pennsylvania. The dam and reservoir are located on the Markleton, Pennsylvania, U.S.G.S. 7.5 minute topographic quadrangle (see Appendix G). The coordinates of the dam are N39° 47.7' and W79° 12.1'.

c. Size Classification. Intermediate (22 feet high, 1,045 acre-feet storage capacity at top of dam).

d. Hazard Classification. Significant (see Section 3.1.e).

e. Owner. Y.M.C.A. of Pittsburgh
304 Wood Street
Pittsburgh, Pennsylvania 15223

f. Purpose. Recreation.

g. Historical Data. According to correspondence and review reports in PennDER files, construction of the dam began in 1931 when a concrete wall 570 feet long was placed, without permit, across the valley by Curtis H. Springer of Somerset, Pennsylvania. Ownership of the partially constructed facility was then purchased by Golon B. Harris (trading as Deer Valley) of Meyersdale, Pennsylvania, in 1938 and then to Messrs. William R. Getty and J. M. Hostetler (trading as Deer Valley, Inc.) in about 1948. In August 1950, Deer Valley, Inc., made application for construction of the existing dam. Plans were prepared by the Neilan Engineers of Somerset, Pennsylvania, and construction was undertaken in October 1950. An extension of the construction permit was requested by the owner in November 1951. A state inspection of the facility in May 1952 revealed that the embankment was being constructed with 1-1/2H:1V slopes and the owner was informed to flatten them to conform to the plans. The embankment was, however, noted to be well compacted. A second state inspection was conducted in August 1952, during which it was noted that the upstream crest above the water line was still too steep, the crest width insufficient, and the spillway shape rectangular rather than ogee-like. The owner, at this time, indicated that the facility would possibly be purchased by the YMCA of Pittsburgh.

In March 1953, the facility was purchased by the YMCA who proceeded to complete the construction of the dam and spillway. Final construction included drawdown of the reservoir for cutting and removal of trees, placement of dumped stone riprap, capping of the spillway crest to form an ogee-like section, and raising the crest of the embankment to provide maximum spillway capacity.

The facility has since remained an integral part of the YMCA, Deer Valley Camp, and no significant modifications to the embankment or spillway (other than covering the spillway bridge) have been performed since its completion.

1.3 Pertinent Data.

a. Drainage Area (square miles). 2.0

b. Discharge at Dam Site. Discharge records are not available.

c. Elevation (feet above mean sea level). The following elevations were obtained from available design drawings and

through field measurements that were based on the elevation of the spillway crest at elevation 2651 feet.

Top of Dam	2655.6 (design) 2654.6 (field)
Maximum Pool Design	Not known
Maximum Pool of Record	Not known
Spillway Crest	2651
Normal Pool	2651
Upstream Inlet Invert	2636
Downstream Outlet Invert	2632.6
Streambed at Dam Centerline	2634
Maximum Tailwater	Not known

d. Reservoir Length (feet).

Top of Dam	4200
Normal Pool	4000

e. Storage (acre-feet).

Top of Dam	1045
Normal Pool	600

f. Reservoir Surface (acres).

Top of Dam	127
Normal Pool	120

g. Dam.

Type	Zoned earth.
Length	800 feet (field measured; including spillway).
Height	22 feet (maximum field measured section; embankment crest to outlet conduit downstream invert).
Top Width	10 feet (field measured).
Slopes	Upstream 2-1/2H:1V Downstream 2H:1V (both slopes locally steepen above normal pool).

	Zoning	Plans and correspondence indicate an impervious core and/or core wall flanked by impervious fill on upstream side and pervious fill on downstream side.
	Impervious Core	Partial concrete cutoff wall (570 feet) and impervious section indicated on plans.
	Cutoff	Concrete cutoff wall with core trench extending to impervious material. Core trench has 8-foot wide base.
	Grout Curtain	None.
h.	Diversion Canal and Regulating Tunnels.	None.
i.	Outlet Works.	
	Type	12-inch diameter pipe (material unknown) encased in concrete.
	Length	95 feet; inlet to outlet.
	Closure	Slide gate protected by trash rack on upstream end. Operated via wheel and valve stem system.
	Access	Manual operator located on foundation block along upstream side of dam crest.
j.	Spillway.	
	Type	Uncontrolled concrete chute with ogee-like crest.

	Crest Elevation	2651 feet.
	Crest Length	37 feet.
	Upstream Channel	Riprap lined trapezoidal shaped approach channel approximately 100 feet in length.
	Downstream Channel	11-foot concrete lined chute discharging into rock lined trapezoidal-shaped channel.
k.	Regulating Outlet	See "Outlet Conduit" above.

SECTION 2
ENGINEERING DATA

2.1 Design.

a. Design Data Availability and Sources. No design data, calculations, or reports are available concerning any aspect of this facility. Design features, presented below, are derived from information and correspondence contained in PennDER files. Included in the files are design drawings, dated photographs, and state inspection memoranda and reports.

b. Design Features.

1. Embankment. Details of the design features are based on available correspondence and the field inspection. The actual as-built configuration of the facility is shown on Figure 1 (field sketch). Figures 2 through 5 are design drawings and have not been revised to show as-built conditions.

The embankment is, in essence, a zoned earth structure with a partial concrete core wall. The upstream slope is 2-1/2H:1V, but locally steeper above normal pool. The upstream face is protected by a durable, well-graded riprap (see Photograph 2). The downstream slope is 2H:1V and is also locally steeper above normal pool level. The crest width is 10 feet.

Available design data and correspondence (including photographs) indicate that a partial concrete corewall (built in 1931) was extended by a core trench/impervious core designed to effect a cutoff. Impervious fill was then placed upstream of the cutoff and pervious fill placed downstream of the cutoff. The fill was reported to be placed in 6-inch lifts and compacted by at least 6 passes of a sheepsfoot roller of at least 100 psi contact pressure.

2. Appurtenant Structures.

a) Spillway. The spillway is a concrete chute structure located at the right abutment. The crest consists of a 37-foot long ogee-like weir approximately 4 feet in height and 6.5 feet wide at its base (see Photographs 3 and 4). There reportedly is a cutoff wall under the weir founded in impervious material, extending about 9 feet into the right abutment, and tied into the original concrete cutoff wall within the embankment. The spillway walls are concrete sections 10 feet high with a maximum base

width of 5 feet and a top width of 1.5 feet. A concrete apron extends about 11 feet downstream of the weir and consists of a 12-inch thick concrete slab on a gravel filter. The downstream end of the slab contains a cutoff wall to impervious materials and is provided with weep holes. The downstream channel is riprap lined for a distance of about 50 feet beyond the concrete apron.

b) Outlet Works. A 12-inch diameter drawdown pipe (blowoff) is located near the center of the dam and is provided with a slide gate and trash rack at its upstream end. The pipe (of unknown material) is reportedly encased in 6-inches of concrete with two cutoff collars under the upstream portion of the embankment (see Figure 3). Outflow is controlled via a wheel, stem, and valve system (see Photograph 6), with the wheel located on the embankment crest.

c. Specific Design Data and Procedures. No specific design data are available for any aspects of the facility.

2.2 Construction Records.

Construction data is limited to PennDER memoranda compiled during construction and several construction photographs. Although limited, this data verifies the existence of the original concrete core wall, delineates various construction changes, and implies that the embankment materials were well compacted.

2.3 Operating Records.

No records of operation are available.

2.4 Other Investigations.

Other than one PennDER inspection report, dated 1963, no records of other investigations are available.

2.5 Evaluation.

Engineering data are limited to design drawings (not as-built), PennDER correspondence, and a few construction photographs. No formal design calculations are available; however, the available data are considered sufficient to make a reasonable Phase I assessment of the facility.

SECTION 3
VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of the facility at the time of inspection suggests that it is in fair condition.

b. Embankment. Observations made during the visual inspection revealed the embankment to be in fair condition. The upstream slope is protected by durable, well-graded riprap (see Photographs 2 and 6). The downstream slope is heavily vegetated with high grass, weeds and small shrubs and appears infrequently maintained (see Photogragh 5). No seepage was observed through the downstream face; however, seepage, ponding, and swamp-like conditions occur along the downstream toe throughout the area from the outlet conduit to within 100 feet of the left abutment (see Photographs 7 and 8). No other deficiencies were observed.

c. Appurtenant Structures.

1. Spillway. The spillway structure was found to be in good condition with minor deficiencies that included scaling of the ogee-like weir crest (see Photograph 4) and minor cracking and spalling of the wingwalls. A 2.3-foot high chain link fish screen obstructs free flow over the weir crest; however, the Camp Director stated that the screen is removed under high flow conditions. In addition, temporary boat docks are located immediately upstream of the spillway approach channel entrance which could cause spillway blockage during major flooding.

2. Outlet Works. The only visible portions of the outlet facilities were the slide gate control mechanism (Photograph 6) and the discharge end of the outlet pipe (Photograph 7). As shown in Photograph 6, the valve stem from the manual control wheel is severely bowed and a support visible just below the water level appeared to be disconnected. The gate mechanism has not been operated for several years and may be inoperable.

d. Reservoir Area. The reservoir is surrounded by steep slopes that are primarily heavily forested (see Photograph 1). No evidence of slope distress was observed in the surrounding area.

e. Downstream Area. Discharge from the spillway of Deer Valley Lake Dam is contained by a broad-based, steep,

boulder strewn valley for about 3 miles below the dam to the confluence of Cove Run with Glade Run. No development is located in this reach. Glade Run then continues to the Casselman River, about 6 miles from the confluence with Cove Run. Glade Run passes under a secondary road at a distance of about 4.5 miles from Deer Valley Lake Dam. A church and residential dwelling are located along the north valley slope about 25 feet above the streambed. Large discharges from Deer Valley Lake Dam are not expected to affect these structures. Thus, the hazard classification is considered to be significant as no other dwellings are located along Cove or Glade Runs and damage from failure would probably be limited to the highway and bridge structures.

3.2 Evaluation.

The overall appearance of the facility indicates it to be in fair condition. Major deficiencies include ponding and seepage at the downstream toe and a possibly inoperable upstream control mechanism on the drawdown pipe.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Normal Operating Procedures.

Deer Valley Lake Dam is a self-regulating facility and there are no formal procedures of operation. The Camp Director, a full-time resident at the facility, stated that the fish screen (see Photographs 3 and 4) is removed during high flows; but the outlet pipe has not been operated in recent years.

4.2 Maintenance of Dam.

There are no formal maintenance procedures in effect at the facility. Some cutting of brush and trees was performed prior to the visit of the inspection team.

4.3 Maintenance of Operating Facilities.

There are no formal maintenance procedures in effect for the spillway system or drawdown facility. The slide gate on the drawdown pipe has not been operated for years. The observed condition of the gate stem (see Photograph 6) indicates that it may be inoperable.

4.4 Warning System.

No formal warning system is in effect. The Camp Director, however, is a full-time resident at the facility.

4.5 Evaluation.

No formal maintenance and operational procedures are associated with any aspect of the facility. There is no formal warning system for the notification of downstream inhabitants in the event of an emergency condition; however, the Camp Director is a full-time resident at the facility.

SECTION 5
HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

No design data, calculations, or formal reports are available. Available data is limited to design drawings and correspondence contained in PennDER files.

5.2 Experience Data.

No records of spillway discharge are available. The present Camp Director indicated that the flood of June 1972 was passed without incident and that the fish screen was removed to provide unobstructed flow through the spillway.

5.3 Visual Observations.

On the date of inspection, no conditions were observed that would indicate the spillway would not perform adequately during a flood event within the limits of its design capacity.

5.4 Method of Analysis.

The facility has been analyzed in accordance with the procedures and guidelines established by the U. S. Army, Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations. The analysis has been performed utilizing a modified version of the HEC-1 program developed by the U. S. Army, Corps of Engineers, Hydrologic Engineering Center, Davis, California. Analytical capabilities of the program are briefly outlined in the preface contained in Appendix C.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with the procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the Spillway Design Flood (SDF) for Deer Valley Lake Dam ranges between the 1/2 PMF (Probable Maximum Flood) and the PMF. This classification is based on the relative size of the dam (intermediate), and the potential hazard of dam failure to downstream developments (significant). Since the dam is on the low side of the intermediate size range, the SDF for this facility is considered to be the 1/2 PMF.

b. Results of Analysis. Deer Valley Lake Dam was evaluated under normal operating conditions. That is, the reservoir was initially at its normal pool or spillway elevation of about 2651.0 feet, with the low-level outlet conduit closed. The spillway is a concrete and riprap lined channel with discharge controlled by a free overfall, concrete, ogee-like weir structure. A covered bridge structure spans the length of the weir crest, and consequently, constricts flow corresponding to higher reservoir levels. Also, a 2.3-foot high chain link fish screen is located atop the weir. It was assumed that the screen would either be removed or would fail prior to the inflow of the flood peaks. All pertinent engineering calculations relative to the evaluation of this facility are provided in Appendix C.

Overtopping analysis (using the modified HEC-1 Computer Program) indicated that the discharge/storage capacity of Deer Valley Lake Dam could accommodate only about 32 percent of the PMF (or about 64 percent of the SDF) prior to overtopping of the embankment (Appendix C, Summary Input/Output Sheets, Sheet D). The peak 1/2 PMF (SDF) inflow of approximately 2500 cfs was greatly attenuated by the discharge/storage capabilities of the dam and reservoir such that the resulting peak 1/2 PMF outflow was about 1760 cfs (Summary Input/Output Sheets, Sheets B and C). Under the 1/2 PMF, the embankment was overtopped for about 5.8 hours, with a maximum depth of inundation of about 0.9 feet above the low top of dam elevation of 2654.6 feet (Summary Input/Output Sheets, Sheet D).

If the embankment crest was regraded and made level with the top of wingwall elevation of about 2655.6 feet, the facility could still accommodate only about 40 percent of the PMF (or about 80 percent of the SDF) prior to embankment overtopping (as inferred from the detailed HEC-1 output).

5.6 Spillway Adequacy.

Although Deer Valley Lake Dam cannot accommodate its SDF (the 1/2 PMF), the possible downstream consequences of embankment failure due to overtopping were not evaluated. Breaching analysis of the dam was not performed in accordance with ETL-1110-2-234, due to the significant downstream hazard classification. Since Deer Valley Lake Dam cannot handle a 1/2 PMF-size flood, its spillway is considered to be inadequate, but not seriously inadequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. The conditions observed at the time of the inspection indicate the embankment is in fair condition. Lack of regular maintenance has resulted in a dense overgrowth of weeds and brush along the downstream slope which hinders inspection and visual evaluation.

Seepage and ponding is evident at the toe of the embankment from the outlet conduit to about 100 feet from the left abutment. The amount of the seepage could not be ascertained with any certainty because of the dense vegetation and ponding; however, no seepage was observed through the face of the dam.

b. Appurtenant Structures.

1. Spillway. The spillway is in good condition and appears to be structurally stable. Minor deficiencies include scaling of the ogee-like crest section and some spalling of the concrete wingwalls.

2. Outlet Works. The slide gate on the outlet conduit has not been operated for years. Inspection of the manual operator at the crest suggests that it may, in fact, be inoperable.

6.2 Design and Construction Techniques.

No data are available relative to the design of the facility. Detailed construction data are not available; however, inspection memoranda and photographs contained in PennDER files imply that the embankment was reasonably well constructed.

6.3 Past Performance.

Discussion with the Camp Director indicated that the hydraulic performance of the facility has been adequate. PennDER records indicate that leakage was observed near the downstream toe (about 400 feet from the left abutment) in 1952 and seepage was also noted around the discharge pipe near dam center in 1960. There are no records confirming studies on remedial action taken to assess or alleviate either condition.

Observations made during the visual inspection indicate that the seepage persists and has caused ponding at the downstream toe.

6.4 Seismic Stability

The dam is located within Seismic Zone No. 1 and may be subject to minor earthquake induced dynamic forces. It is believed that the static stability of the embankment is sufficient to withstand such forces although no calculations or investigations were performed to confirm this opinion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. Visual observations indicate the structure to be in fair condition. The most significant deficiency noted was seepage and ponding of water along the downstream toe from the outlet conduit to within 100 feet of the left abutment. The origin of the seepage was not readily ascertained due to the heavy overgrowth of weeds and brush on the downstream slope and swamp-like conditions below the toe area. No seepage was observed through the embankment face. Other deficiencies include spalling and scaling of the spillway concrete and an apparent inoperable outlet system.

Hydrologic and hydraulic calculations, performed as part of this investigation, indicate that the facility can pass and/or store about 32 percent of the PMF, or about 64 percent of the SDF (1/2 PMF), prior to overtopping of the embankment. Based on screening criteria supplied by the Corps of Engineers, the spillway is deemed inadequate, but not seriously inadequate.

b. Adequacy of Information. The available information is considered sufficient to make a reasonable Phase I assessment of the facility.

c. Urgency. The studies and remedial action recommended below should be undertaken immediately.

d. Necessity for Additional Investigations. Studies to further assess the spillway adequacy and to assess and/or monitor the seepage condition along the downstream toe are recommended.

7.2 Recommendations/Remedial Measures.

It is recommended that the owner:

a. Have the facility studied by a registered professional engineer experienced in the hydraulics and hydrology of dams and take the necessary remedial measures to make the spillway system hydraulically adequate.

b. Clear the dense overgrowth from the downstream slope, particularly near the toe, to enable expedient inspection and evaluation of the toe area.

c. Take remedial measures to drain the ponded water along the downstream toe and install a weir or weirs under the direction of a registered professional engineer, experienced in the design of earth dams, to evaluate the seepage conditions.

d. Have the drawdown mechanism inspected to assess the condition of the slide gate and control rod and take remedial measures to restore the operability of the system.

e. Develop a formal manual of operation and maintenance to insure the proper care and utilization of the facility. Included in the manual should be provisions for removing the fish screen from the spillway crest and securing or removing the temporary docks at the entrance to the spillway during periods of large flow.

f. Develop an emergency warning system to notify downstream inhabitants in the event emergency conditions develop. Included in the plan should be provisions for around-the-clock surveillance during periods of unusually heavy precipitation.

APPENDIX A

CHECK LIST - ENGINEERING DATA

NAME OF DAM: Deer Valley Lake Dam

NDI#: PA-230 PENNDER# : 56-76

CHECK LIST
ENGINEERING DATA
PHASE I

ITEM	REMARKS NDI# PA -230
PERSONS INTERVIEWED AND TITLE	Ed Hecker - Executive Director, YMCA of Pittsburgh Resident Camp Director, Deer Valley Lake
REGIONAL VICINITY MAP	See Appendix G. (U.S.G.S. 7.5 minute topographic quadrangle Markleton, PA)
CONSTRUCTION HISTORY	Inferred from available information and correspondence contained in PennDER files. See report Section 1.2.g "Historical Data".
AVAILABLE DRAWINGS	Complete set of 4 design drawings dated July 24, 1950, by the Neilan Engineers of Somerset, PA are contained in PennDER files (see Appendix F).
TYPICAL DAM SECTIONS	See Figures 2, 3 and 4, Appendix F.
OUTLETS: PLAN DETAILS DISCHARGE RATINGS	See Figures 2 and 3, Appendix F. Discharge curves are not available.

ITEM	REMARKS NDI# PA - 230
SPILLWAY: PLAN SECTION DETAILS	See Figures 2 and 5, Appendix F.
OPERATING EQUIPMENT PLANS AND DETAILS	See Figure 5, Appendix F. Outlet conduit gate valve has reportedly not been operated for at least 7 years.
DESIGN REPORTS	None available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS: HYDROLOGY AND HYDRAULICS STABILITY ANALYSES SEEPAGE ANALYSES	None available.
MATERIAL INVESTIGATIONS: BORING RECORDS LABORATORY TESTING FIELD TESTING	None available.

ITEM	REMARKS	NDI# PA - 230
BORROW SOURCES	Not known.	
POST CONSTRUCTION DAM SURVEYS	None.	
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.	
HIGH POOL RECORDS	Formal records are not maintained.	
MONITORING SYSTEMS	None.	
MODIFICATIONS	Cover on bridge added in 1974.	

ITEM	REMARKS NDI# PA -230
PRIOR ACCIDENTS OR FAILURES	None. Lake drained in 1955 to facilitate the downing and removal of trees from within the reservoir.
MAINTENANCE: RECORDS MANUAL	Maintenance is performed as needed on an unscheduled basis. No formal maintenance records or manual are available.
OPERATION: RECORDS MANUAL	None.
OPERATIONAL PROCEDURES	No formal procedures. The facility is virtually self-regulating and outlet conduit has not been operated for several years.
WARNING SYSTEM AND/OR COMMUNICATION FACILITIES	No formal warning system has been established.
MISCELLANEOUS	Facility purchased by the YMCA of Pittsburgh in 1952.

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

NDI ID # 56-76
PENN DER ID # PA-230

SIZE OF DRAINAGE AREA: 2.0 square miles

ELEVATION TOP NORMAL POOL: 2651 STORAGE CAPACITY: 600 acre-feet

ELEVATION TOP FLOOD CONTROL POOL: - STORAGE CAPACITY: -

ELEVATION MAXIMUM DESIGN POOL: - STORAGE CAPACITY: -

ELEVATION TOP DAM: 2654.6 STORAGE CAPACITY: 1045 acre-feet

SPILLWAY DATA

CREST ELEVATION: 2651

TYPE: Rectangular concrete chute w/ogee-like weir crest,

CREST LENGTH: 37 feet

CHANNEL LENGTH: 13 feet

SPILLOVER LOCATION: Right abutment

NUMBER AND TYPE OF GATES: None

OUTLET WORKS

TYPE: 12-inch diameter conduit (material unknown)

LOCATION: Approximate center of embankment

ENTRANCE INVERTS: 2636

EXIT INVERTS: 2632.6

EMERGENCY DRAWDOWN FACILITIES: Manually operated slide gate mounted on upstream end of conduit.

HYDROMETEOROLOGICAL GAGES

TYPE: None

LOCATION: -

RECORDS: -

MAXIMUM NON-DAMAGING DISCHARGE: Not known

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

NAME OF DAM Deer Valley Lake Dam STATE Pennsylvania COUNTY Somerset

NDI# PA - 230 PENNDER# 56-76

TYPE OF DAM Zoned Earth SIZE Intermediate HAZARD CATAGORY Significant

DATE(S) INSPECTION 11 July 1979 WEATHER Partly Cloudy TEMPERATURE 80° @ 1:00 PM

POOL ELEVATION AT TIME OF INSPECTION 2651 M.S.L.

TAILWATER AT TIME OF INSPECTION 2633 M.S.L.

INSPECTION PERSONNEL	OWNER REPRESENTATIVES	OTHERS
B. M. Mihalcin	YMCA of Pittsburgh	
W. J. Veon	Ed Hecker - Camp Director	
D. L. Bonk		

RECORDED BY D. L. Bonk

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 230
SURFACE CRACKS	None observed.
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Horizontal - Good Vertical - settlements of approximately 1-foot measured along the embankment crest.
RIPRAP FAILURES	Riprap has been disturbed in several areas along the upstream embankment slope.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Good.

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA -230
DAMP AREAS IRREGULAR VEGETATION (LUSH OR DEAD PLANTS)	340-foot by 15-foot swamp-like area located along downstream toe of embankment between the outlet conduit and left abutment. No definite areas of seepage were observed through the embankment face.
ANY NOTICEABLE SEEPAGE	Flow along downstream toe, as described above, estimated to be about 2 to 3 GPM was observed at a distance about 150-feet left of the outlet conduit. Seepage has accumulated in the vicinity of the outlet creating a pond measuring about 75 feet long by 20-feet wide.
STAFF GAGE AND RECORDER	None observed.
DRAINS	None observed.

OUTLET WORKS

ITEM	OBSERVATIONS AND/OR REMARKS	NDI# PA - 230
INTAKE STRUCTURE	Submerged, not observed.	
OUTLET CONDUIT (CRACKING AND SPALLING OF CONCRETE SURFACES)	Submerged, not observed.	
OUTLET STRUCTURE	None observed.	
OUTLET CHANNEL	Flat ponded area, poorly drained.	
GATE(S) AND OPERATIONAL EQUIPMENT	Valve stem and wheel located along upstream face about 400 feet from right abutment. Stem is corroded and bent and of questionable operability.	

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 230
TYPE AND CONDITION	Concrete and riprap lined rectangular chute channel with ogee-like weir. Concrete surfaces are in fair condition with minor scaling, spalling and several popouts observed. Downstream riprap channel in good condition.
APPROACH CHANNEL	100 foot long rectangular channel partially lined with riprap.
SPILLWAY CHANNEL AND SIDEWALLS	Concrete surfaces in fair condition. Cracking and efflorescence observed along both wingwalls. Minor scaling and several popouts were observed across the overflow weir and channel floor. 2.3-foot high fish-catch cyclone fence is located atop overflow weir.
STILLING BASIN PLUNGE POOL	None.
DISCHARGE CHANNEL	Rock-lined trapezoidal-shaped channel.
BRIDGE AND PIERS	Wooden covered bridge supported on two steel beams spans the spillway channel.
EMERGENCY GATES	None.

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 230
TYPE AND CONDITION	N/A
APPROACH CHANNEL	N/A
OUTLET STRUCTURE	N/A
DISCHARGE CHANNEL	N/A

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 230
MONUMENTATION SURVEYS	None.
OBSERVATION WELLS	None.
WEIRS	None.
PIEZOMETERS	None.
OTHERS	

ITEM	OBSERVATIONS AND/OR REMARKS NDI# PA - 230
SLOPES: RESERVOIR	Steep and heavily forested.
SEDIMENTATION	None observed.
DOWNSTREAM CHANNEL (OBSTRUCTIONS, DEBRIS, ETC.)	Undefined flow area through a valley containing large sandstone boulders for a distance of about 1200 feet downstream of dam at which point channel enters a swamp-like area created by a small beaver dam.
SLOPES: CHANNEL VALLEY	Discharge from the spillway is contained in a broad-based, steep, boulder strewn valley for about 3 miles below the dam to the confluence of Cove Run with Glade Run.
APPROXIMATE NUMBER OF HOMES AND POPULATION	No developments are located between the dam and the confluence of Cove and Glade Runs. However, Glade Run continues for another 6 miles until it eventually reaches the Casselman River. Glade Run passes under a secondary road at a distance of about 4.5 miles from the dam. A church and residential dwelling are located along the North Valley slope about 25 feet above the streambed. Large discharges from Cove Lake are
	not expected to affect these structures. Consequently, the hazard classification is considered to be significant.

APPENDIX C

HYDROLOGY AND HYDRAULICS

PREFACE

The modified HEC-1 program is capable of performing two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam; and (2) the estimation of the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. Briefly, the computational procedures typically used in the dam overtopping analysis are as follows:

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.

c. Routing of the outflow hydrograph(s) from the reservoir to desired downstream locations. The results provide the peak discharge(s), time(s) of the peak discharge(s), and the maximum stage(s) of each routed hydrograph at the downstream end of each reach.

The evaluation of the hydrologic-hydraulic consequences resulting from an assumed structural failure (breach) of the dam is typically performed as outlined below.

a. Development of an inflow hydrograph(s) to the reservoir.

b. Routing of the inflow hydrograph(s) through the reservoir.

c. Development of a failure hydrograph(s) based on specific breach criteria and normal reservoir outflow.

d. Routing of the failure hydrograph(s) to desired downstream locations. The results provide estimates of the peak discharge(s), time(s) to peak, and maximum water surface elevation(s) of the failure hydrograph(s) for each location.

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM

BY WJV DATE 7-24-79 PROJ. NO. 78-617-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. 1 OF 14

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DAM STATISTICS

HEIGHT OF DAM ≈ 22 FT (FIELD MEASURED)
(MEASURED FROM TOP OF BLOWOFF OUTLET PLUS 1FT TO OUTLET INVERT)

MAXIMUM POOL STORAGE CAPACITY ≈ 1045 AC-FT (FROM HEC-1)
@ TOP OF DAM

NORMAL POOL STORAGE CAPACITY ≈ 600 AC-FT (NOTE 1)

DRAINAGE AREA ≈ 2.0 SQ. MI.

[PLANIMETERED OFF THE 7.5 MINUTE USGS QUAD: MARKLETON, PA]

NOTE 1: NORMAL POOL STORAGE CAPACITY OBTAINED FROM "REPORT UPON THE APPLICATION OF DEER VALLEY, INC (FOR THE CONSTRUCTION OF A DAM ACROSS COVE RUN, IN ELKLICK TOWNSHIP, SOMERSET COUNTY, PENNSYLVANIA", DATED AUGUST 2, 1950, AS FOUND IN PENNDER FILES.

DAM CLASSIFICATION

DAM SIZE - INTERMEDIATE (REF 1, TABLE 1)
(BASED ON MAXIMUM STORAGE)

HAZARD CLASSIFICATION - SIGNIFICANT (FIELD OBSERVATION)

REQUIRED SDF - ½ PMF TO PMF (REF 1, TABLE 3)

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
BY WJV DATE 7-24-79 PROJ. NO. 78-617-230
CHKD. BY DLB DATE 7-31-79 SHEET NO. 2 OF 14

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HYDROGRAPH PARAMETERS

LENGTH OF LONGEST WATERCOURSE ≈ 1.9 MI

L_{CA} ≈ 0.9 MI (MEASURED ALONG THE LONGEST WATERCOURSE FROM THE DAM TO THE CENTROID OF THE BASIN)

NOTE 2: VALUES OF L AND L_{CA} ARE MEASURED FROM THE USGS 7.5 MINUTE MARKLETON, PA QUAD. ALL VARIABLES ARE DEFINED IN REF 2, IN THE SECTION ENTITLED "SNYDER SYNTHETIC UNIT HYDROGRAPH"

C_t ≈ 1.0
C_p ≈ 0.40
[SUPPLIED BY COE, ZONE 25 OHIO RIVER BASIN]

t_p = SNYDER'S STANDARD LAG ≈ $1.0 (L \times L_{CA})^{0.3}$

$\therefore\ t_p \approx 1.0 (1.9 \times 0.9)^{0.3} \approx 1.17$ HRS

RESERVOIR SURFACE AREAS

SURFACE AREA (SA) @ NORMAL POOL EL 2651 FT ≈ 120 AC

NOTE 3: NORMAL POOL ELEVATION OBTAINED FROM FIG 4. THE ELEVATIONS GIVEN ON THE VARIOUS DRAWINGS ARE 1' LOW ACCORDING TO CORRESPONDENCE IN PENNDER FILES. THE 1' CORRECTION HAS BEEN TAKEN INTO ACCOUNT IN THESE CALCULATIONS. THE NORMAL POOL SURFACE AREA VALUE WAS OBTAINED FROM THE REFERENCE OF NOTE 1, SHEET 1.

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SA @ EL 2660 ≈ 138 AC (PLANIMETERED OFF THE USGS MARKLETON, PA QUAD)

LOW TOP OF DAM EL 2654.6 FT (FIELD MEASURED)

RATE OF SURFACE AREA INCREASE PER FOOT OF RESERVOIR RISE:

$$\Delta SA/\Delta H \approx (138-120)AC/(2660-2651) \approx 2.0\ AC/FT$$

$$\therefore SA @ \text{Low Top of Dam} \approx 120AC + [(2.0\ AC/FT)(2654.6-2651)FT]$$
$$\approx 127\ AC$$

RESERVOIR ELEVATION @ "0" STORAGE

NORMAL POOL VOLUME ≈ 1/3 HA ≈ 600 AC-FT (CONIC METHOD)

SA @ NORMAL POOL EL 2651 FT ≈ 120 AC (SHEET 2)

$$\therefore H \approx (600\ AC\text{-}FT)(3)/(120\ AC) \approx 15\ FT$$

ZERO VOLUME ELEVATION ≈ 2651 FT - 15 FT ≈ 2636 FT

NOTE 4: THE ABOVE COMPUTED "0" VOLUME ELEVATION COMPARES FAVORABLY WITH THAT INFERRED FROM FIG 3.

RESERVOIR ELEVATION-STORAGE RELATIONSHIP

COMPUTED INTERNALLY BY THE HEC-1 PROGRAM, BASED ON THE GIVEN ELEVATION VS STORAGE INFORMATION AS PRESENTED ABOVE. (SEE SUMMARY INPUT/OUTPUT SHEETS)

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
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PMP CALCULATIONS

- APPROXIMATE RAINFALL INDEX = 24 IN (REF 3, FIG 1)
  (CORRESPONDING TO A DURATION OF 24 HOURS AND AN AREA OF 200 SQ MI, IN SOUTHWESTERN PENNSYLVANIA)

- DEPTH - AREA - DURATION ZONE #7 (REF 3, FIG 1)

- DRAINAGE AREA ≈ 2.0 SQ MI ⇒ ASSUME THAT DATA CORRESPONDING TO A 10 SQ MI AREA IS REPRESENTATIVE OF THIS BASIN:

DURATION (HR)	PERCENT OF INDEX RAINFALL (%)
6	102
12	120
24	130
48	140

- HOP BROOK FACTOR (ADJUSTMENT FOR BASIN SHAPE AS WELL AS FOR THE LESSER LIKELIHOOD OF A SEVERE STORM CENTERING OVER A SMALLER BASIN) CORRESPONDING TO A DA ≈ 2.0 SQ MI (< 10 SQ MI) ⇒ 0.90 (REF 4, PG 49)

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM

BY WJV DATE 7-24-79 PROJ. NO. 78-617-230

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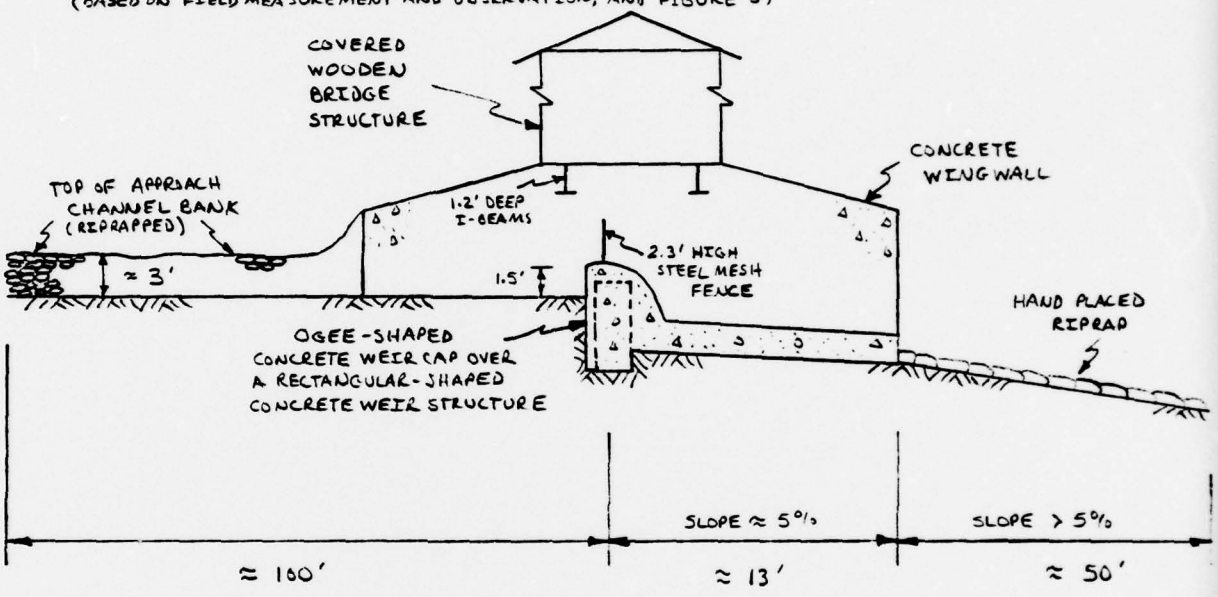
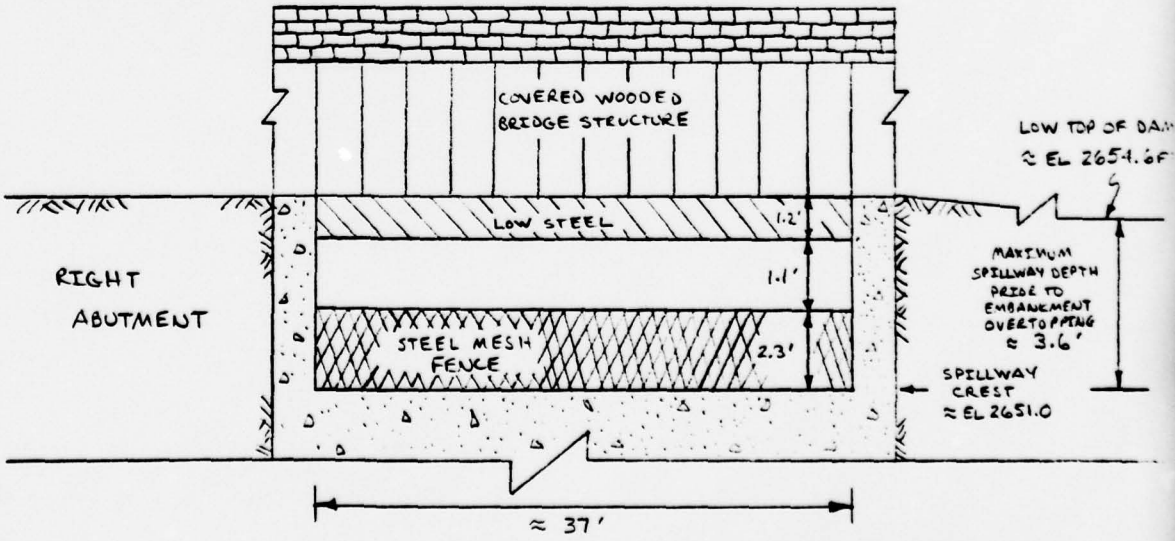
SPILLWAY CAPACITY

- PROFILE OF SPILLWAY : (NOT TO SCALE)
(BASED ON FIELD MEASUREMENT AND OBSERVATION, AND FIGURE 5)



- CROSS-SECTION OF SPILLWAY : (NOT TO SCALE)
(BASED ON FIELD MEASUREMENTS AND OBSERVATIONS, AND FIGURE 5)



SECTION TAKEN LOOKING UPSTREAM TOWARD SPILLWAY

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
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- THE SPILLWAY IS A CONCRETE AND RIPRAP CHANNEL WITH DISCHARGE CONTROLLED BY A FREE OVERFALL, CONCRETE, OGEE-SHAPED WEIR STRUCTURE. A COVERED BRIDGE STRUCTURE SPANS THE LENGTH OF THE SPILLWAY W/ ITS LOW STEEL ≈ 1.2 FT IN DEPTH. A 2.3FT STEEL-MESH FENCE IS ATTACHED TO THE WEIR CREST; HOWEVER THE FENCE DOES NOT APPEAR TO BE SOUND ENOUGH TO RESIST FAILURE UNDER HIGHER HEADS. THE SPILLWAY DISCHARGES WILL BE REPRESENTED BY WEIR FLOW FOR EFFECTIVE HEADS (H_e) UP TO ≈ 3.4 FT. WEIR FLOW IS DEFINED BY THE RELATIONSHIP:

$$Q = C\ L\ H_e^{3/2} \qquad \text{(REF 4, PG 373)}$$

WHERE Q = DISCHARGE, IN CFS;
L = WEIR CREST LENGTH ≈ 37 FT;
H_e = EFFECTIVE HEAD ABOVE WEIR CREST ≈ (RESERVOIR ELEVATION) − (WEIR CREST ELEVATION OF 2651 FT) − (APPROACH CHANNEL LOSSES), IN FT;
C = DISCHARGE COEFFICIENT = f (DESIGN HEAD, ACTUAL HEAD, FOREBAY DEPTH, US WEIR SLOPE, DS APRON EFFECTS, AND SUBMERGENCE).

FOR EFFECTIVE HEADS > 3.4 FT, SPILLWAY DISCHARGES WILL BE REPRESENTED BY ORIFICE FLOW (UNDER LOW HEADS) WHICH IS DEFINED BY:

$$Q = \tfrac{2}{3}\sqrt{2g}\ C\ L\ (H_e^{3/2} - H_2^{3/2}) \qquad \text{(REF 4, PG 335)}$$

WHERE Q, L, AND H_e ARE AS ABOVE;
H_2 ≈ HEAD ABOVE TOP OF ORIFICE ≈ (EFFECTIVE HEAD ELEVATION) − (BOTTOM ELEVATION OF LOW STEEL OF ≈ 2654.4 FT);
C ≈ DISCHARGE COEFFICIENT = f ($\frac{H_e - H_2}{H_e}$, AND REF 4, PG 3[illegible]

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
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- ASSUME WEIR FLOW CONTROLS PRIOR TO EMBANKMENT OVERTOPPING @ EL 2654.6 FT ⇒ HEIGHT ABOVE SPILLWAY CREST ≈ 3.6 FT

a) DISCHARGE COEFFICIENT ⇒ ASSUMING DESIGN HEAD (H_o) ≈ 4.6 FT (HEIGHT OF TOP OF WINGWALL ABOVE WEIR CREST) AND FOREBAY DEPTH (P) ≈ 1.5 FT (FIELD MEASURED) ⇒ $P/H_o \approx 1.5\text{ FT}/4.6\text{ FT} \approx 0.33 \Rightarrow C_o \approx 3.7$ (REF 4, PG 378

SINCE ACTUAL HEAD PRIOR TO OVERTOPPING ≈ 3.6 FT ⇒ DISCHARGE COEFFICIENT (FOR HEAD LESS THAN DESIGN) ≈ (3.7)(0.97) ≈ 3.59, BASED ON ACTUAL HEAD TO DESIGN HEAD RATIO OF $H/H_o \approx 3.6/4.6 \approx 0.78$ AND REF 4, PG 378.

APRON EFFECTS AND SUBMERGENCE EFFECTS ARE ASSUMED TO BE NEGLIGIBLE DUE TO THE GRADE OF THE OUTFLOW CHANNEL.

b) APPROACH CHANNEL LOSSES: APPROACH CHANNEL IS APPROXIMATELY RECTANGULAR IN CROSS-SECTION WITH ABOUT 3-FT BANKS FOR MOST OF ITS 100 FT LENGTH (FIELD MEASURED). THE WINGWALLS EXTEND ABOUT 15 FT INTO THE FOREBAY AREA AND VARY FROM 3 FT IN HEIGHT AT THEIR UPSTREAM ENDS TO ABOUT 6.1 FT AT THE SPILLWAY.

ESTIMATED APPROACH VELOCITY PRIOR TO OVERTOPPING:

$$v_a \approx Q/A_a \approx (3.59)(37\text{FT})(3.6\text{FT})^{3/2}/(37\text{FT})(1.5\text{FT} + 3.6\text{FT}) \approx 4.9\text{ FPS}$$

⇒ APPROACH VELOCITY HEAD = $v_a^2/2g \approx (4.9)^2/2g \approx 0.36$ FT

AND, APPROACH CHANNEL ENTRANCE LOSS $\approx 0.1\ v_a^2/2g$
$\Rightarrow 0.1\ (0.36) \approx 0.04$ FT (REF 4, PG 379)

APPROACH CHANNEL FRICTION LOSS = $h_f \approx (v_a\, n / 1.49\, R_h^{2/3})^2 \times L_c$
(REF 4, PG 379)

WHERE L_c = APPROACH CHANNEL LENGTH $\approx$ 100FT;
n = MANNING'S ROUGHNESS COEFFICIENT
≈ 0.04 (REF 7, PG 112; EXCAVATED CHANNEL W/ COBBLE BOTTOM AND CLEAN SIDES)
R_h = HYDRAULIC RADIUS = FLOW AREA / WETTED PERIMETER,
FLOW AREA = $A_a \approx 189\ FT^2$, WETTED PERIMETER
$\approx 37FT + 2\{[(3FT \times 85FT) + (4.1FT \times 15FT)]/100\ FT\}$
$\approx 43.3FT \Rightarrow R_h \approx 189\ FT^2/43.3FT \approx 4.4FT$

$\therefore h_f \approx (100FT)\left[(4.8)(0.04)/(1.49)(4.4)^{2/3}\right]^2 \approx 0.23FT$

$\therefore$ TOTAL APPROACH LOSS $\approx 0.04 + 0.23 \approx 0.27FT$

$\Rightarrow$ EFFECTIVE HEAD $\approx 3.6FT - 0.27FT \approx 3.33FT$

c) SPILLWAY CAPACITY PRIOR TO OVERTOPPING:

$$Q = CLH_e^{3/2} \approx (3.59)(37FT)(3.33FT)^{3/2}$$
$$\approx 810\ CFS$$

SINCE $H_e \approx 3.33 < 3.4FT \Rightarrow$ WEIR FLOW CONTROLS

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
BY WJV DATE 7-25-79 PROJ. NO. 78-617-230
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SPILLWAY RATING CURVE

- FOR EFFECTIVE HEADS < 3.4 FT ⇒ WEIR FLOW CONTROLS W/ DISCHARGE DEFINED BY:

$$Q = C L H_e^{3/2} \qquad \text{(SHEET 6)}$$

ASSUME THAT DESIGN HEAD ≈ 4.6 FT, FOREBAY DEPTH ≈ 1.5 FT ⇒ DESIGN DISCHARGE COEFFICIENT (C_o) ≈ 3.7 (SHEET 7). APPROACH CHANNEL INFORMATION IS GIVEN ON SHEET 7. WEIR FLOW RATING TABLE GIVEN ON SHEET 10.

- FOR EFFECTIVE HEADS > 3.4 FT ⇒ ORIFICE FLOW CONTROLS W/ DISCHARGE DEFINED BY:

$$Q = \tfrac{2}{3}\sqrt{2g}\; C L \left(H_e^{3/2} - H_2^{3/2}\right) \qquad \text{(SHEET 6)}$$

APPROACH CHANNEL LOSSES WILL BE CONSIDERED IN DETERMINING BOTH H_e AND H_2. ORIFICE FLOW RATING TABLE GIVEN ON SHEET 11.

SUBJECT DAM SAFETY INSPECTION

DEER VALLEY LAKE DAM

BY WJV DATE 7-25-79 PROJ. NO. 79-617-230

CHKD. BY DRB DATE 7-31- SHEET NO. 10 OF 14

- WEIR CONTROL PORTION OF RATING CURVE :

RESERVOIR ELEVATION (FT)	ACTUAL HEAD H (FT)	① H/H_o (FT/FT)	② C/C_o	③ C	④ INITIAL Q (CFS)	⑤ A_a (FT^2)	⑥ v_a (FPS)	$v_a^2/2g$ (FT)	$0.1\ v_e^2/2g$ (FT)	⑦ h_f (FT)	⑧ EFFECTIVE HEAD H_e (FT)	⑨ FINAL Q (CFS)
2651.0	0	–	–	–	0	–	–	–	–	–	–	0
2651.5	0.5	0.11	0.82	3.03	40	74	0.5	0.00	0.00	0.01	0.49	40
2652.0	1.0	0.22	0.86	3.18	120	93	1.3	0.03	0.00	0.04	0.96	110
2652.5	1.5	0.33	0.89	3.29	220	111	2.0	0.06	0.01	0.08	1.41	200
2653.0	2.0	0.43	0.91	3.37	350	130	2.7	0.11	0.01	0.12	1.87	320
2653.5	2.5	0.54	0.93	3.44	500	148	3.4	0.18	0.02	0.16	2.32	450
2654.0	3.0	0.65	0.95	3.52	680	167	4.1	0.26	0.03	0.20	2.77	600
2654.5	3.5	0.76	0.96	3.55	860	185	4.6	0.33	0.03	0.22	3.25	770
2654.6	3.6	0.78	0.97	3.59	910	189	4.8	0.36	0.04	0.23	3.33	810
2654.7	3.7	0.80	0.97	3.59	950	192	4.9	0.37	0.04	0.24	*3.42	~~840~~

* > 3.4 FT

∴ ORIFICE FLOW CONTROLS

① $H_o \approx 4.6$FT

② REF 4, PG 378, FIG. 250

③ $C \approx 3.7 \times C/C_o$

④ $Q \approx CLH^{3/2}$, w/ $L \approx 37$FT

⑤ $A_a \approx (37\text{FT}) \times (1.5\text{FT} + H)$

⑥ $v_a \approx Q/A_a$

⑦ $h_f \approx (100\text{FT}) \times \left[(v_a)(0.04)/(1.49) R_h^{2/3} \right]^2$, WHERE :

$$R_h \approx A_a \Big/ \left\{ 37\text{FT} + \left[2 \left(\left[\underbrace{3\text{FT} \times 85\text{FT}}_{\text{FOR } H > 1.5\text{FT, OTHERWISE} = H+1.5\text{FT}} \right] + \left[15\text{FT} \times (3\text{FT} + 1.5\text{FT} + H)/2 \right] \right) / 100\text{FT} \right] \right\}$$

⑧ $H_e \approx H - (0.1\ v_a^2/2g) - h_f$

⑨ $Q \approx CLH_e^{3/2}$

SUBJECT DAM SAFETY INSPECTION — DEER VALLEY LAKE DAM

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- ORIFICE CONTROL PORTION OF RATING CURVE :

RESERVOIR ELEVATION (FT)	① ACTUAL HEAD H (FT)	② INITIAL H_2 (FT)	③ C	④ INITIAL Q (CFS)	⑤ A_a (FT^2)	⑤ v_a (FPS)	⑤ $v_a^2/2g$ (FT)	⑤ $0.1\ v_a^2/2g$ (FT)	⑤ h_f (FT)	⑤ EFFECTIVE HEAD H_e (FT)	⑥ FINAL H_2 (FT)	⑦ FINAL Q (CFS)
2654.7	3.7	0.3	0.64	880	192	4.6	0.32	0.03	0.21	3.46	0.06	810
2654.8	3.8	0.4	0.64	910	196	4.6	0.32	0.03	0.20	3.57	0.17	850
2654.9	3.9	0.5	0.64	930	200	4.7	0.34	0.03	0.21	3.66	0.26	870
2655.0	4.0	0.6	0.64	950	204	4.7	0.34	0.03	0.20	3.77	0.37	900
2655.2	4.2	0.8	0.64	1000	211	4.7	0.34	0.03	0.19	3.98	0.58	950
2655.5	4.5	1.1	0.64	1060	222	4.8	0.36	0.04	0.19	4.27	0.87	1020
2655.6	4.6	1.2	0.64	1080	226	4.8	0.36	0.04	0.18	4.38	0.98	1040
2656.0	5.0	1.6	0.65	1180	241	4.9	0.37	0.04	0.18 *	4.78	1.38	1140
2657.0	6.0	2.6	0.66	1370	278	4.9	0.37	0.04	0.15 *	5.81	2.41	1340

① H = RESERVOIR ELEVATION - SPILLWAY CREST EL 2651 FT

② H_2 = RESERVOIR ELEVATION - BRIDGE LOW-STEEL EL 2654.4 FT

③ REF 4, PG 386, FIGURE 257; BASED ON $(H-H_2)/H$

④ $Q \approx \frac{2}{3}\sqrt{2g}\ C\ (37FT)\ (H^{3/2} - H_2^{3/2})$

⑤ DEFINITIONS GIVEN ON SHEET 10

⑥ FINAL $H_2 \approx$ INITIAL $H_2 - (0.1\ v_a^2/2g) - h_f$

⑦ $Q = \frac{2}{3}\sqrt{2g}\ C\ (37FT)\ (H_e^{3/2} - H_2^{3/2})$

* WETTED PERIMETER $\approx$ 43.5 FT $\Rightarrow$ $R_h \approx A_a / 43.5FT$ RATHER THAN THE RELATIONSHIP ON SHEET 10.

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM
BY WJV DATE 7-25-79 PROJ. NO. 79-617-230
CHKD. BY DLB DATE 7-31-79 SHEET NO. 12 OF 14

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EMBANKMENT RATING CURVE

- LENGTH OF EMBANKMENT SUBMERGED VS RESERVOIR ELEVATION (BASED ON FIELD MEASUREMENTS)

EMBANKMENT LENGTH (FT)	RESERVOIR ELEVATION (FT)	
50	2654.6	
175	2654.7	
375	2654.9	
525	2654.9	
610	2655.0	
670	2655.2	
740	2655.5	
750	2655.6	} BASED PARTIALLY ON ESTIMATED ABUTMENT SIDESLOPES OF ABOUT 5H TO 1V FOR THE LEFT SIDE AND ABOUT 8H TO 1V FOR THE RIGHT SIDE
755	2656.0	
770	2657.0	

- ASSUME THE EMBANKMENT ACTS LIKE A BROAD-CRESTED WEIR WHEN OVERTOPPED, W/ DISCHARGE DEFINED BY

$$Q = CLH^{3/2}$$ (SHEET 6)

HOWEVER, IN THIS CASE (ASSUMING A TRAPEZOIDAL SHAPED WEIR W/ BOTTOM WIDTH OF 50 FT), H = WEIGHTED VALUE = [(H, ABOVE LEVEL, 50 FT, SECTION × CORRESPONDING FLOW AREA) + (AVERAGE H_2 ABOVE INCLINED SECTIONS WHICH VARIES FROM 0FT TO H_1 × CORRESPONDING FLOW AREA)] / (TOTAL FLOW AREA); C = DISCHARGE COEFFICIENT = f(H/L, W/ L = BREADTH OF CREST ≈ 10FT, AND REF 12, PG 4½).

SUBJECT DAM SAFETY INSPECTION

DEER VALLEY LAKE DAM

BY WJV DATE 7-25-79 PROJ. NO. 79-617-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. 13 OF 14

- EMBANKMENT RATING CURVE

RESERVOIR ELEVATION (FT)	LEVEL CREST PORTION ① H_1 (FT)	② A_1 (FT^2)	$H_1 \times A_1$ (FT^3)	INCLINED CREST PORTION ③ H_2 (FT)	④ A_2 (FT^2)	$H_2 \times A_2$ (FT^3)	⑤ WEIGHTED H (FT)	H/ℓ (FT/FT)	⑥ C	⑦ L (FT)	⑧ EMBANKMENT Q (CFS)
2654.6	0	-	-	0	-	-	0	-	-	50	0
2654.7	0.1	5	0.5	0.05	12.5	0.63	0.06	0.01	2.91	175	10
2654.8	0.2	10	2.0	0.1	65.0	6.5	0.11	0.01	2.92	375	40
2654.9	0.3	15	4.5	0.15	143	21.5	0.16	0.02	2.95	525	100
2655.0	0.4	20	8.0	0.2	224	44.8	0.22	0.02	2.98	610	190
2655.2	0.6	30	18.0	0.3	372	112	0.32	0.03	3.00	670	360
2655.5	0.9	45	40.5	0.45	621	279	0.48	0.05	3.02	740	740
2655.6	1.0	50	50.0	0.5	700	350	0.53	0.05	3.02	750	870
2656.0	1.4	70	98.0	0.7	987	691	0.75	0.08	3.03	755	1490
2657.0	2.4	120	288	1.2	1728	2074	1.28	0.13	3.04	770	3390

① H_1 = RESERVOIR ELEVATION - LOW TOP OF DAM EL 2654.6 FT

② $A_1 = H_1 \times 50FT$

③ $H_2 = (0FT + H_1)/2$

④ $A_2 = 2 \times \frac{H_1 \times (L - 50FT)}{2} \approx H_1 \times (L - 50FT)$

⑤ $H \approx [(H_1 \times A_1) + (H_2 \times A_2)] / (A_1 + A_2)$

⑥ REF 12, PG 46 ; BASED ON H/ℓ , w/ $\ell \approx 10'$

⑦ FROM SHEET 12

⑧ $Q = C L H^{3/2}$

SUBJECT DAM SAFETY INSPECTION
DEER VALLEY LAKE DAM

BY WJV DATE 7-25-79 PROJ. NO. 78-617-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. 14 OF 14

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TOTAL FACILITY RATING CURVE

TOTAL DISCHARGE = $Q_{SPILLWAY} + Q_{EMBANKMENT}$

RESERVOIR ELEVATION (FT)	① $Q_{SPILLWAY}$ WEIR (CFS)	① $Q_{SPILLWAY}$ ORIFICE (CFS)	② $Q_{EMBANKMENT}$ (CFS)	Q_{TOTAL} (CFS)
2651.0	0	-	-	0
2651.5	40	-	-	40
2652.0	110	-	-	110
2652.5	200	-	-	200
2653.0	320	-	-	320
2653.5	450	-	-	450
2654.0	600	-	-	600
2654.5	770	-	-	770
LOW TOP OF DAM - ELEVATION 2654.6	810	-	0	810
2654.7	-	810	10	820
2654.8	-	850	40	890
2654.9	-	870	100	970
2655.0	-	900	190	1090
2655.2	-	950	360	1310
2655.5	-	1020	740	1760
2655.6	-	1040	870	1910
2656.0	-	1140	1490	2630
2657.0	-	1340	3390	4730

① FROM SHEETS 10 AND 11
② FROM SHEET 13

SUBJECT DAM SAFETY INSPECTION — DEER VALLEY LAKE DAM

BY WJV DATE 7-31-79 PROJ. NO. 78-017-233

CHKD. BY DLR DATE 7-31-79 SHEET NO. A OF D

OVERTOPPING ANALYSIS

SUMMARY INPUT/OUTPUT SHEETS

DAM SAFETY INSPECTION
COVE LAKE DAM ******* [OVERTOPPING ANALYSIS] ******
10-MINUTE TIME STEP AND 48-HOUR STORM DURATION

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METHC	IPLT	IPRT	NSTAN
288	0	10	0	0	0	0	0	0	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 5 LRTIO= 1
RTIOS= .10 .20 .30 .40 .50

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW INTO COVE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.00	0.00	2.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	24.00	102.00	120.00	130.00	140.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

INITIAL AND CONSTANT RAINFALL LOSSES AS PER COE

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOR	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.17 CP= .40 NTA= 0

BASE FLOW PARAMETERS AS PER COE

RECESSION DATA
STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 7.34 AND R=13.05 INTERVALS

SUBJECT DAM SAFETY INSPECTION

BY WJV DATE 7-31-79 PROJ. NO. 79-617-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. 8 OF D

DEER VALLEY LAKE DAM

UNIT HYDROGRAPH 73 END-OF-PERIOD ORDINATES, LAG= 1.10 HOURS, CP= .40 VOL= 1.00

20.	76.	156.	246.	337.	405.	444.	443.	414.	383.
355.	329.	305.	282.	261.	247.	224.	208.	192.	178.
165.	153.	142.	130.	121.	112.	104.	97.	89.	83.
77.	71.	66.	61.	56.	52.	48.	45.	42.	38.
36.	33.	31.	28.	26.	24.	22.	21.	19.	18.
17.	15.	14.	13.	12.	11.	10.	10.	9.	8.
8.	7.	7.	6.	6.	5.	5.	4.	4.	4.
4.	3.	3.							

O MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	END-OF-PERIOD FLOW COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.88	24.46	2.42	182328.
										(683.)	(621.)	(61.)	(5162.95)

RESERVOIR INFLOW HYDROGRAPHS

PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4996.	3392.	1228.	632.	182086.
CMS	141.	96.	35.	18.	5156.
INCHES		15.78	22.85	23.53	23.53
MM		400.69	580.31	597.54	597.54
AC-FT		1682.	2436.	2508.	2508.
THOUS CU M		2074.	3004.	3094.	3094.

0.5 PMF (SDF)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	2498.	1696.	614.	316.	91043.
CMS	71.	48.	17.	9.	2578.
INCHES		7.89	11.42	11.76	11.76
MM		200.34	290.15	298.77	298.77
AC-FT		841.	1218.	1254.	1254.
THOUS CU M		1037.	1502.	1547.	1547.

0.4 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1998.	1357.	491.	253.	72834.
CMS	57.	38.	14.	7.	2062.
INCHES		6.31	9.14	9.41	9.41
MM		160.28	232.12	239.02	239.02
AC-FT		673.	974.	1003.	1003.
THOUS CU M		830.	1202.	1237.	1237.

0.3 PMF

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	1499.	1017.	368.	190.	54626.
CMS	42.	29.	10.	5.	1547.
INCHES		4.73	6.85	7.06	7.06
MM		120.21	174.09	179.26	179.26
AC-FT		505.	731.	752.	752.
THOUS CU M		622.	901.	928.	928.

HYDROGRAPH ROUTING

ROUTE INFLOW THROUGH RESERVOIR

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
101	1	0	0	0	0	1	0	0

ROUTING DATA

OLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

SUBJECT DAM SAFETY INSPECTION

DEER VALLEY LAKE DAM

BY WJV DATE 7-31-79 PROJ. NO. 79-677-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. C OF D

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	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	-2651.	-1

STAGE	2651.00	2651.50	2652.00	2652.50	2653.00	2653.50	2654.00	2654.50	2654.60
	2654.80	2654.90	2655.00	2655.20	2655.50	2655.60	2656.00	2657.00	
FLOW	0.00	40.00	110.00	200.00	320.00	450.00	600.00	770.00	810.00
	890.00	970.00	1090.00	1310.00	1760.00	1910.00	2630.00	4730.00	
SURFACE AREA=	0.	120.	127.	138.					
CAPACITY=	0.	600.	1045.	1760.					
ELEVATION=	2636.	2651.	2655.	2660.					

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
2651.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
2654.6	0.0	0.0	0.

RESERVOIR OUTFLOW HYDROGRAPHS;
OVERTOPPING OCCURS @ ≈ 0.32 PMF

PEAK OUTFLOW IS 1762. AT TIME 42.83 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME	
CFS	1762.	1269.	427.	216.	62197.	
CMS	50.	36.	12.	6.	1761.	
INCHES		5.90	7.95	8.04	8.04	0.5 PMF
MM		149.90	201.90	204.11	204.11	
AC-FT		629.	847.	857.	857.	
THOUS CU M		776.	1045.	1057.	1057.	

PEAK OUTFLOW IS 1166. AT TIME 43.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME	
CFS	1166.	915.	315.	159.	45847.	
CMS	33.	26.	9.	5.	1298.	
INCHES		4.25	5.85	5.92	5.92	0.4 PMF
MM		108.07	148.69	150.45	150.45	
AC-FT		454.	624.	632.	632.	
THOUS CU M		559.	770.	779.	779.	

PEAK OUTFLOW IS 708. AT TIME 43.83 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME	
CFS	708.	628.	217.	110.	31665.	
CMS	20.	18.	6.	3.	897.	
INCHES		2.92	4.04	4.09	4.09	0.3 PMF
MM		74.23	102.59	103.91	103.91	
AC-FT		312.	431.	436.	436.	
THOUS CU M		384.	531.	538.	538.	

SUBJECT DAM SAFETY INSPECTION

DEER VALLEY LAKE DAM

BY WJV DATE 7-31-79 PROJ. NO. 79-617-230

CHKD. BY DLB DATE 7-31-79 SHEET NO. D OF D

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SUMMARY OF DAM SAFETY ANALYSIS

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2651.00	2651.00	2654.60
STORAGE	600.	600.	1045.
OUTFLOW	0.	0.	810.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	2652.32	0.00	760.	168.	0.00	44.67	0.00
.20	2653.38	0.00	891.	420.	0.00	44.00	0.00
.30	2654.32	0.00	1009.	708.	0.00	43.83	0.00
.40	2655.07	.47	1104.	1166.	4.17	43.33	0.00
.50	2655.50	.90	1160.	1762.	5.83	42.83	0.00

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APPENDIX D

PHOTOGRAPHS

PHOTOGRAPH 1 View of Deer Valley Lake, looking east from the right abutment.

PHOTOGRAPH 2 View of the spillway approach channel and upstream embankment face as seen from the right abutment.

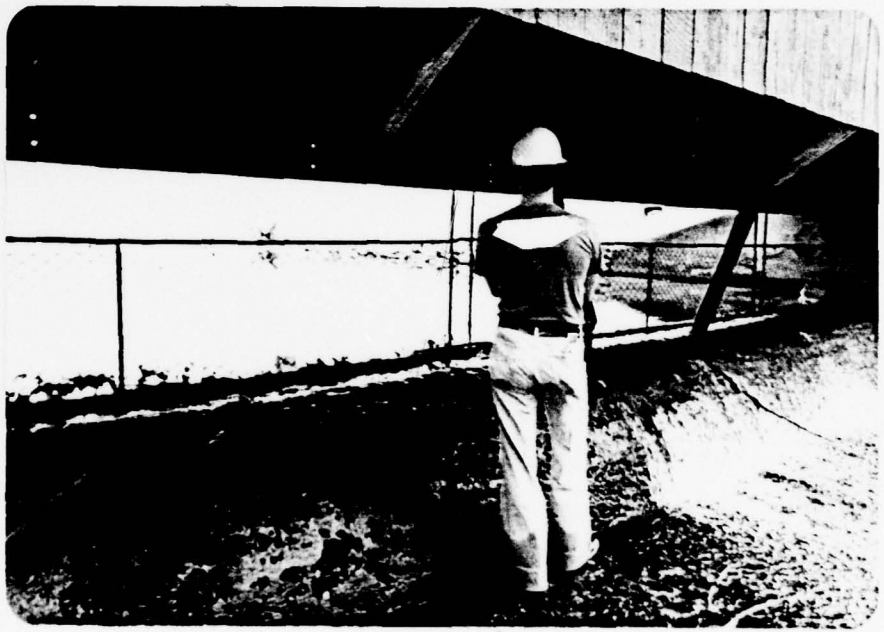
PHOTOGRAPH 3 View of the spillway located at the right abutment. Note the removable fish catch screen atop the overflow crest.

PHOTOGRAPH 4 Close-up view of the scaled condition of the concrete spillway weir.

1

2

3



4

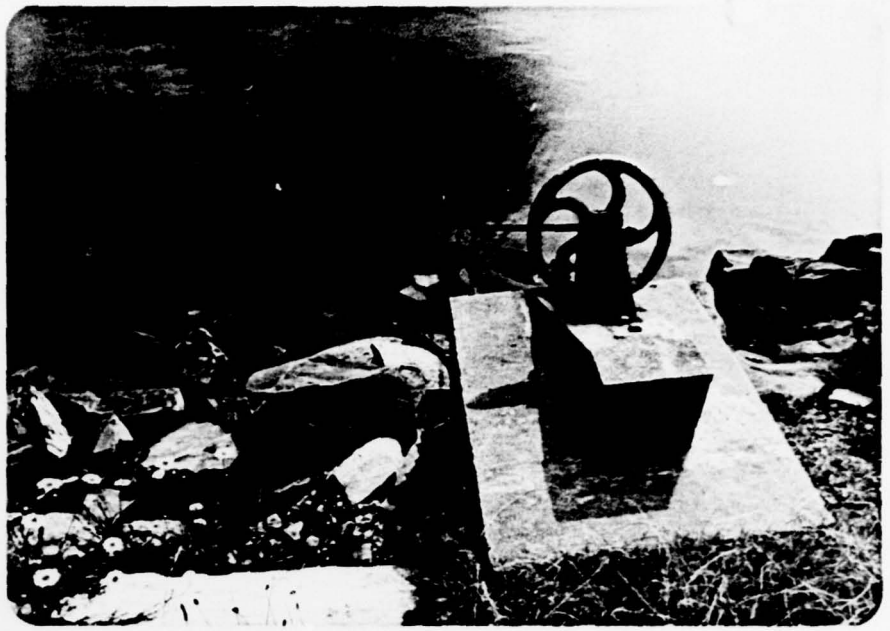
PHOTOGRAPH 5 View of the heavy overgrowth across the downstream embankment face.

PHOTOGRAPH 6 Close-up view of the outlet conduit gate control located along the upstream embankment face. Note the bent valve stem.

PHOTOGRAPH 7 Close-up view of the partially submerged discharge end of the outlet conduit located at the downstream embankment toe.

PHOTOGRAPH 8 View, from the embankment crest, of the ponded condition at the downstream embankment toe around the outlet conduit.

5



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8

APPENDIX E

GEOLOGY

Geology

Deer Valley Lake Dam is located approximately 12 miles west of the Allegheny Topographic Front within the Allegheny Mountain Section of the Appalachian Plateau Province. The Allegheny Mountain Section is characterized by gently folded sedimentary rock strata of Pennsylvanian age or older. Major structural axes strike from southwest to northeast with flanking strata dipping northwest and southeast.

Structurally, the dam and reservoir lie immediately west of the Negro Mountain Anticline and just over a mile from Mt. Davis, the highest point in Pennsylvania. With a normal pool elevation of 2651 feet, Deer Valley Lake is, perhaps, the highest lake in the commonwealth. The bedrock flanking the Negro Mountain Anticline dips to the northwest at just under 400 feet per mile or approximately 4 degrees in the immediate vicinity of the dam and reservoir.

The strata underlying the alluvial and residual soils at the dam site are members of the Mauch Chunck Formation which is the uppermost Mississippian age unit in southern Somerset County. The Mauch Chunck is an interbedded sequence of shale and sandstone with minor amounts of siltstone and limestone. On Negro Mountain the Mauch Chunck is composed of 56 percent shale, 36 percent sandstone, 7 percent siltstone and 0.5 percent limestone. About 50 percent of the beds are red in color, 35 percent are gray to light gray, and 15 percent are green to greenish gray. In

the Mt. Davis area the Mauch Chunck can be subdivided into a lower and upper part on a lithologic basis. The upper part of the Mauch Chunck contains no limestone beds. It is composed primarily of red shale, but does contain some sandstone and minor calcareous shale. The lower portion contains considerable calcareous shale and calcareous sandstone, and two beds of commercial limestone, each about 8 feet thick. Both limestones are either quarried or deep mined south of the reservoir. It is believed that the embankment is constructed on the middle portion of the Mauch Chunck Formation.

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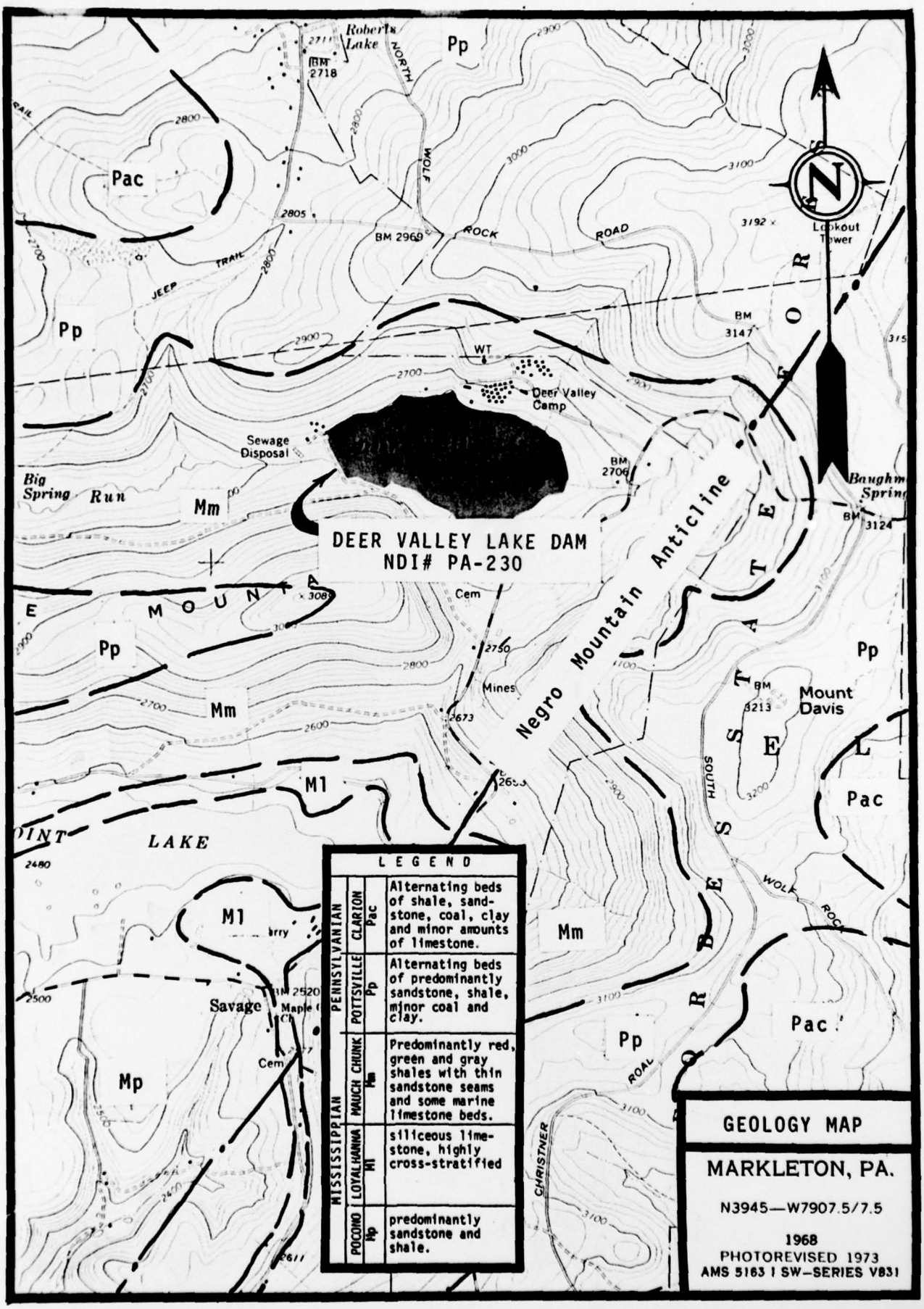

DEER VALLEY LAKE DAM
NDI# PA-230
Negro Mountain Anticline
Roberts Lake
BM 2718
NORTH
WOLF
ROCK
ROAD
TRAIL
JEEP
GAIL
BM 2969
Lookout Tower
3192
BM 3147
WT
Deer Valley Camp
Sewage Disposal
BM 2706
Big Spring Run
Baughm Spring
BM 3124
Cem
Mines
2750
2673
Mount Davis
BM 3213
SOUTH
WOLF ROCK
ROAL
CHRISTNER
Savage
BM 2520
Maple
Cem
LAKE
Pp
Pac
Mm
M1
Mp
LEGEND
PENNSYLVANIAN
CLARION Pac
Alternating beds of shale, sandstone, coal, clay and minor amounts of limestone.
POTTSVILLE Pp
Alternating beds of predominantly sandstone, shale, minor coal and clay.
MISSISSIPPIAN
MAUCH CHUNK Mm
Predominantly red, green and gray shales with thin sandstone seams and some marine limestone beds.
LOYALHANNA M1
siliceous limestone, highly cross-stratified
POCONO Mp
predominantly sandstone and shale.
GEOLOGY MAP
MARKLETON, PA.
N3945—W7907.5/7.5
1968
PHOTOREVISED 1973
AMS 5163 I SW—SERIES V831

APPENDIX F

FIGURES

LIST OF FIGURES

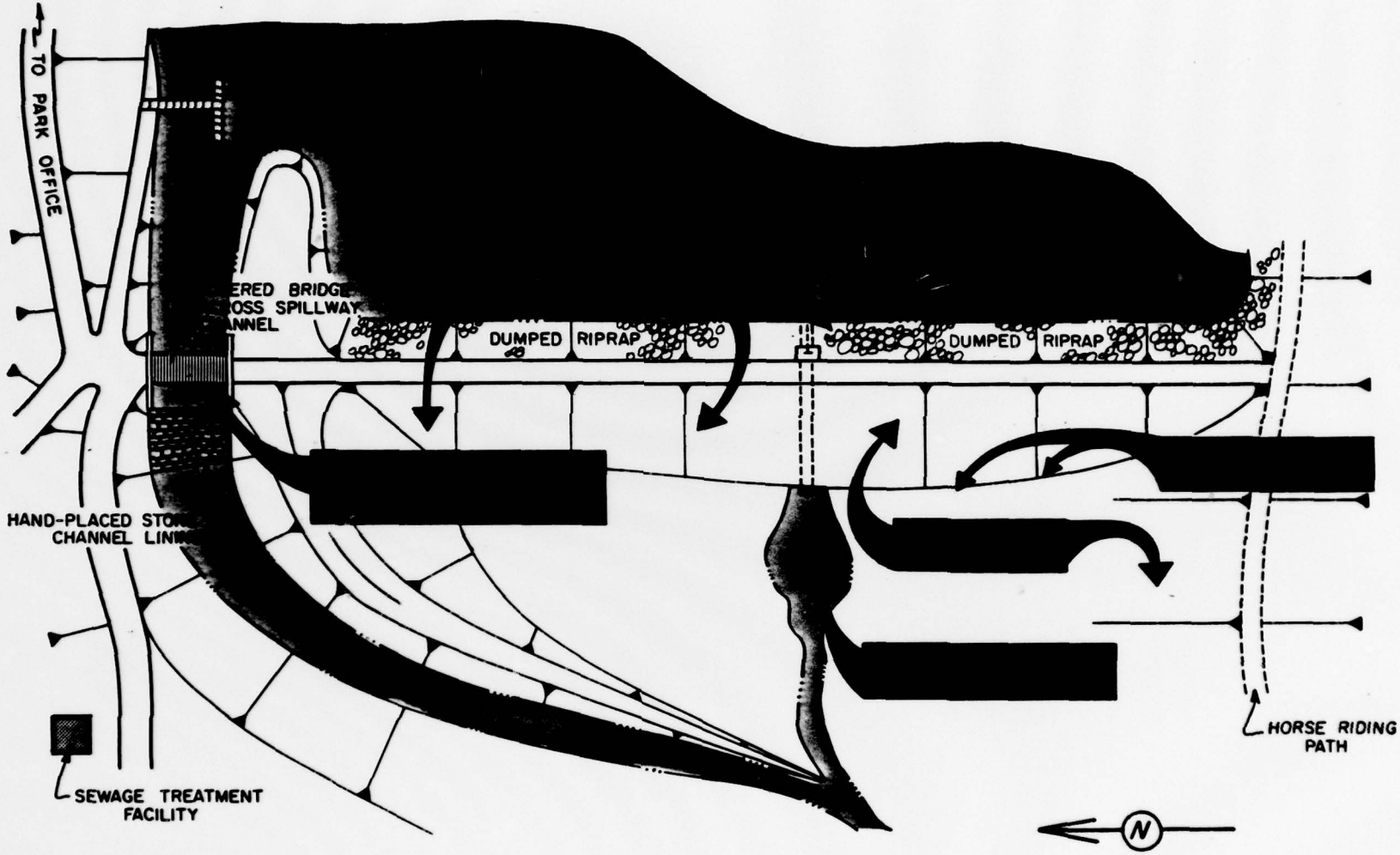
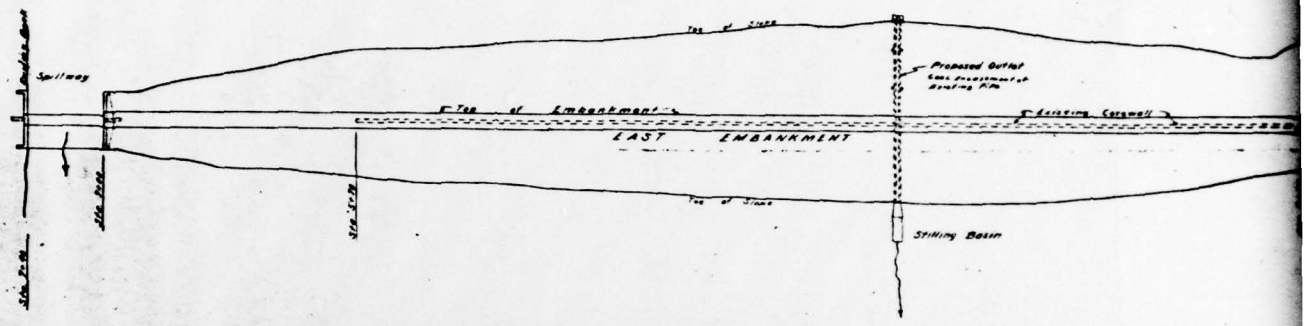
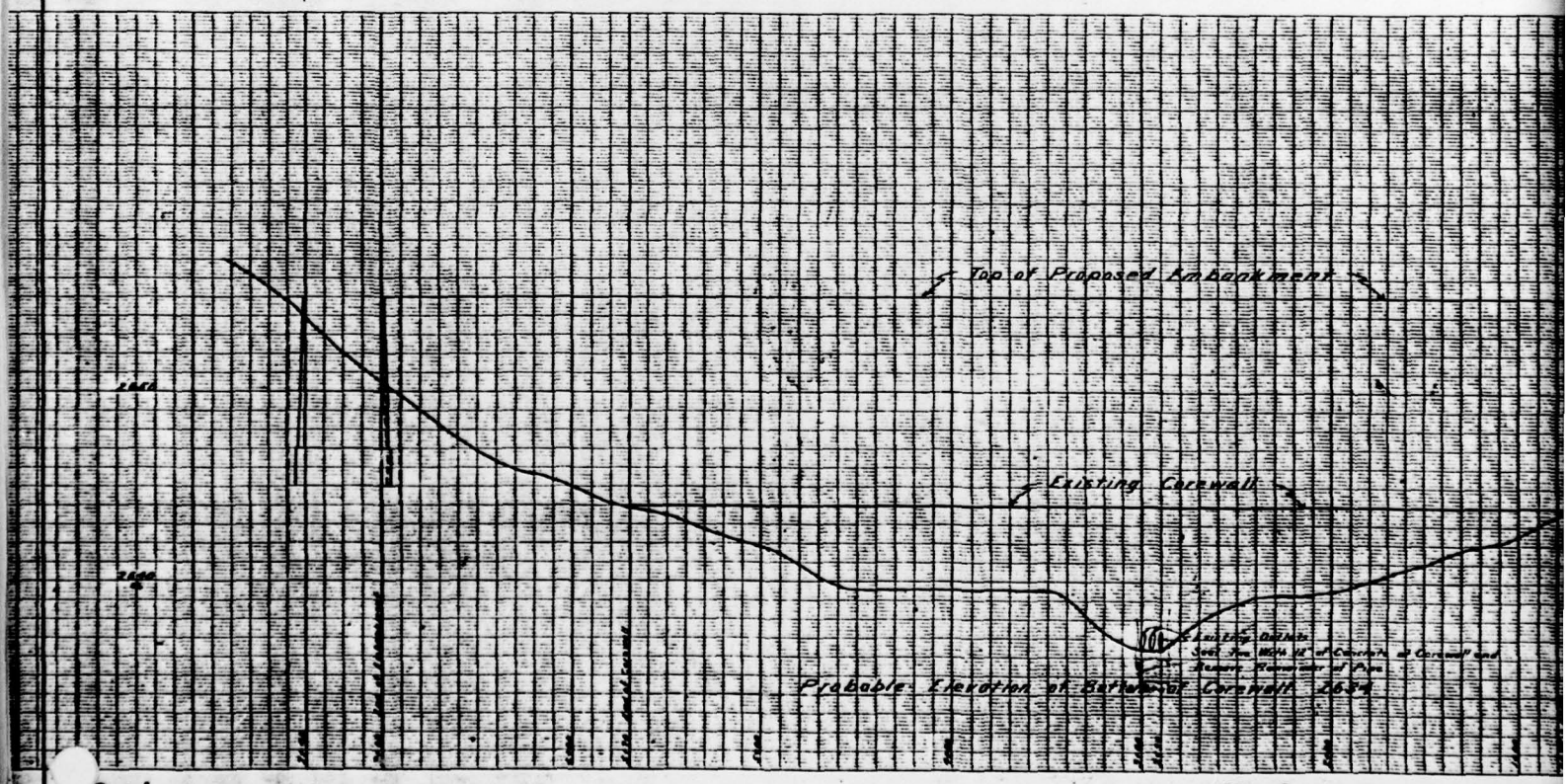


FIGURE 1 - DEER VALLEY LAKE DAM
GENERAL PLAN : FIELD INSPECTION NOTES





"Boscier" PROFILE PLAN
PLATE A
B.K. ELLIOTT CO.
MADE IN U.S.A.

"Boscier" PROFILE PLAN
PLATE A
B.K. ELLIOTT CO.
MADE IN U.S.A.

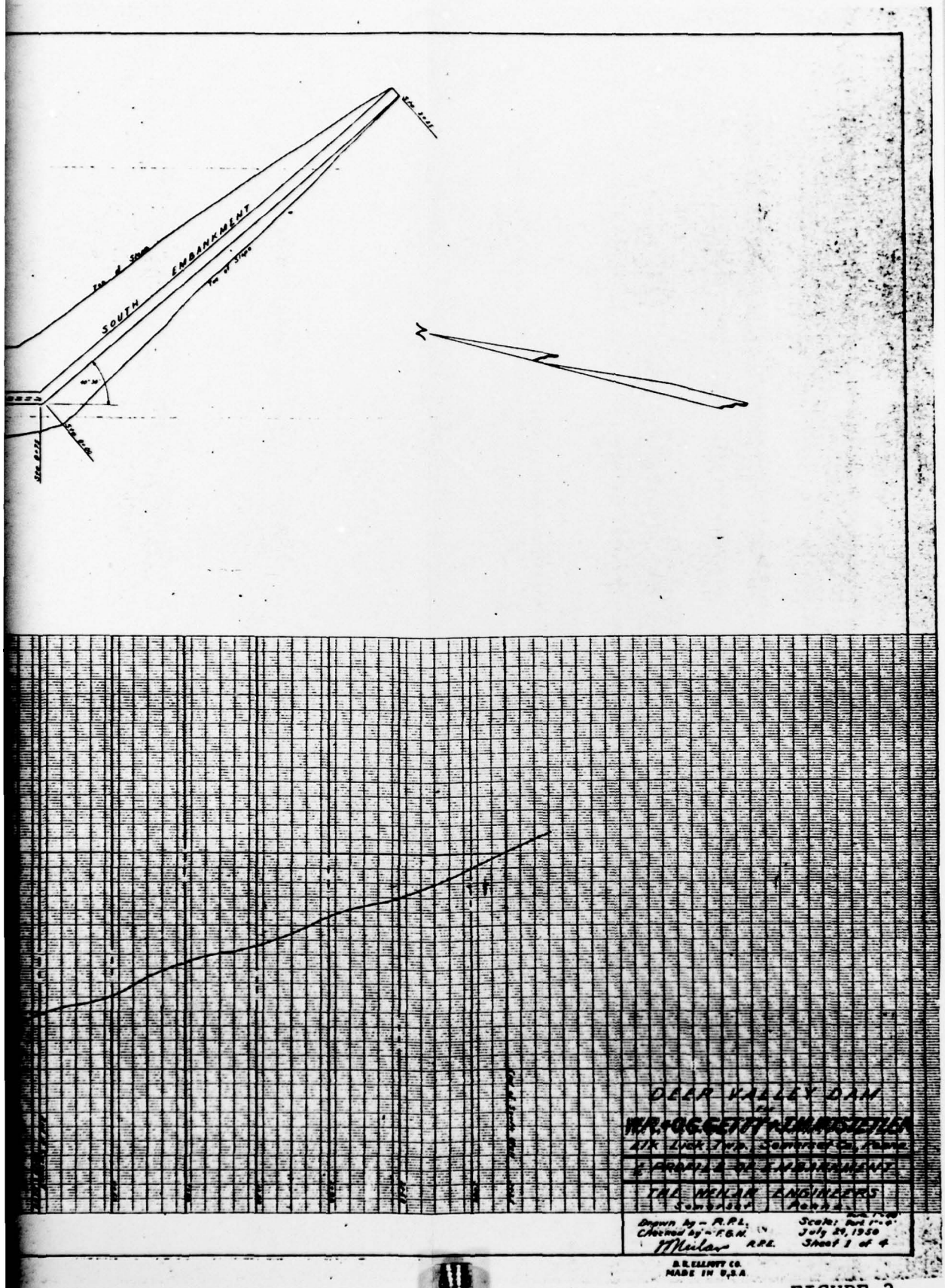
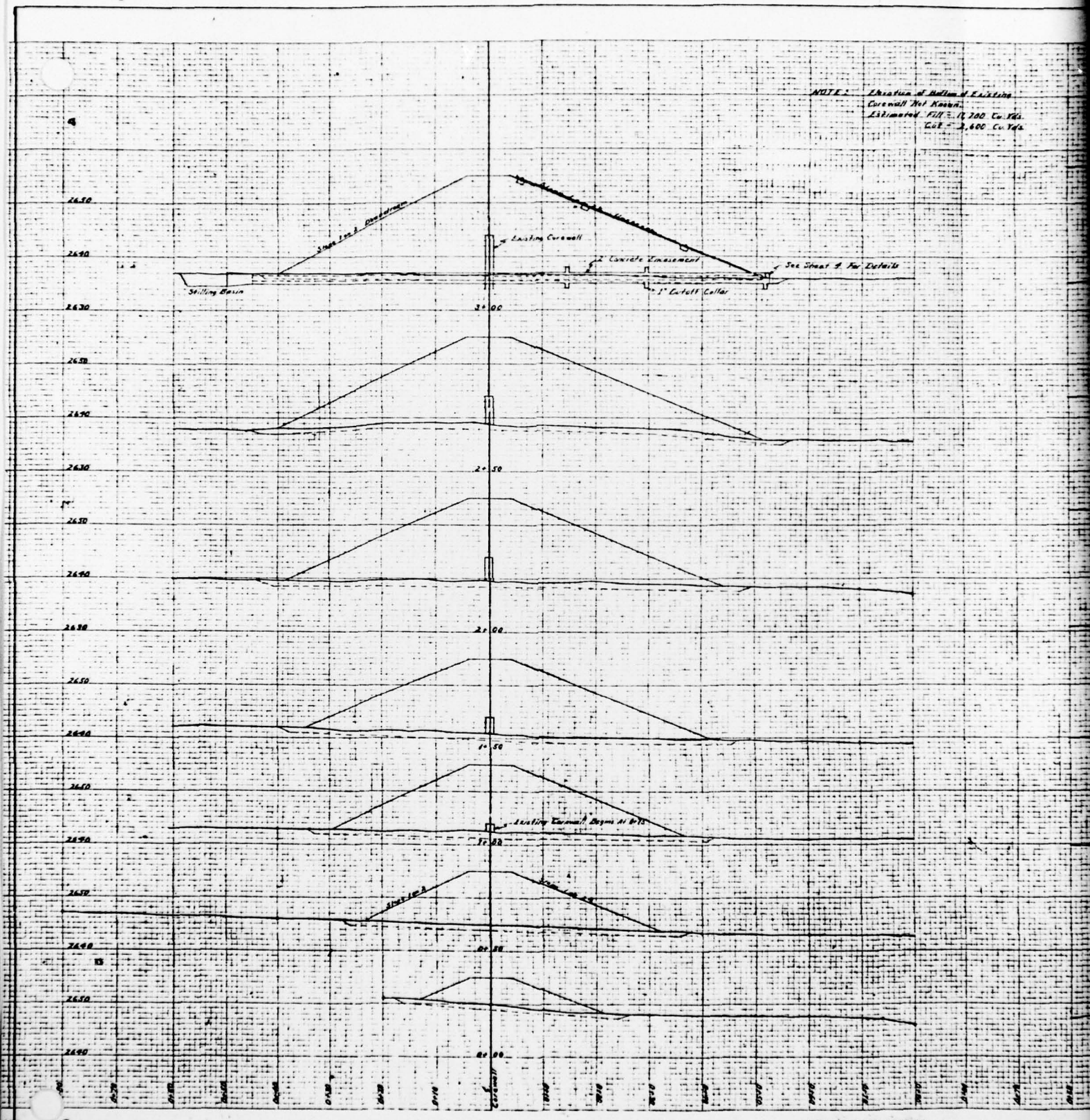

SOUTH EMBANKMENT
Top of Slope
Top of Slope
DEER VALLEY DAM
Drawn by - R.P.L.
Checked by - F.G.M.
T Meilan R.P.E.
Scale: 1in = 0'
July 29, 1950
Sheet 1 of 4
B.R. ELLIOTT CO.
MADE IN U.S.A.

FIGURE 2



CHARLES BRUNING COMPANY
CROSS SECTION 10 x 10

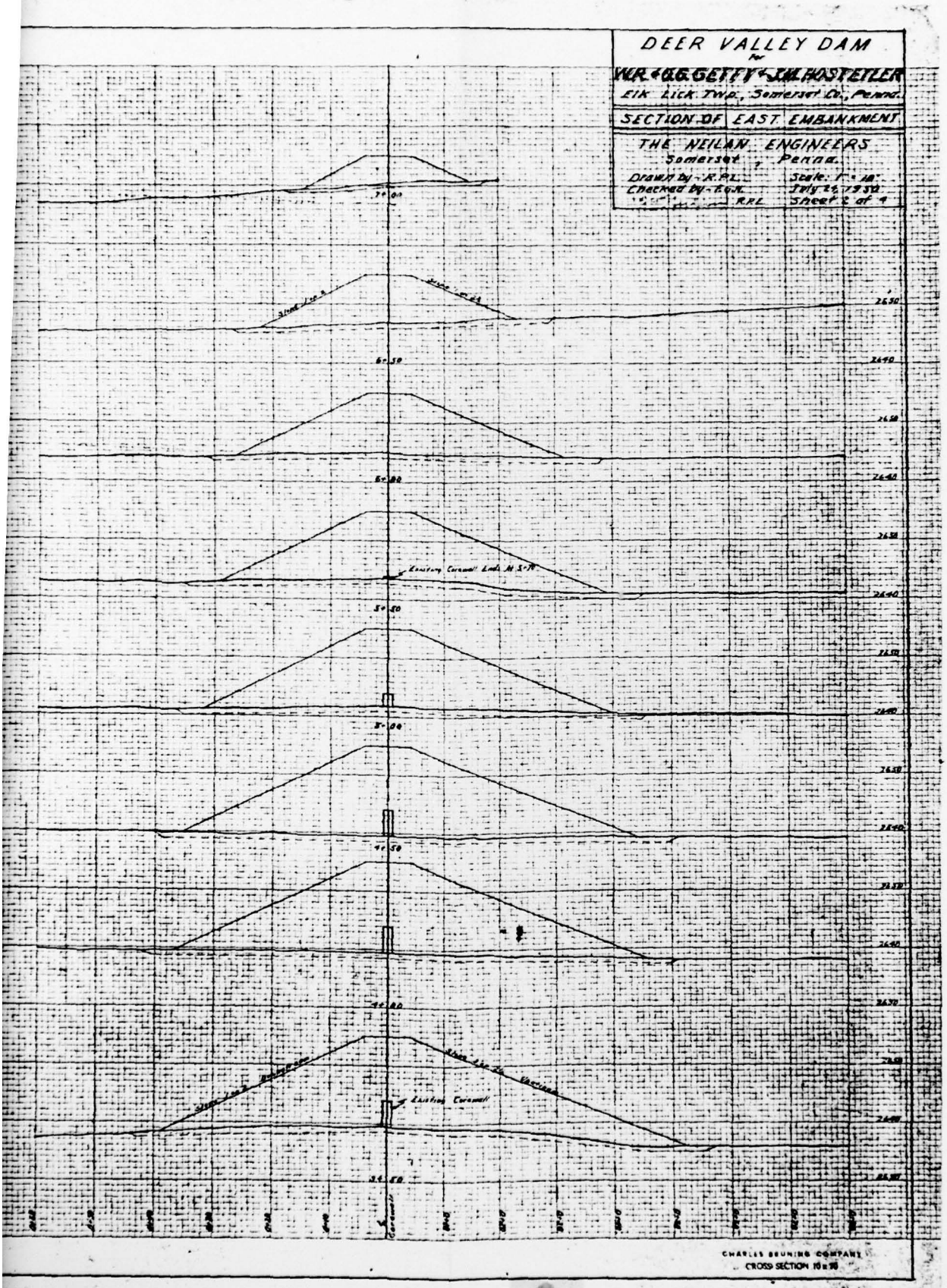
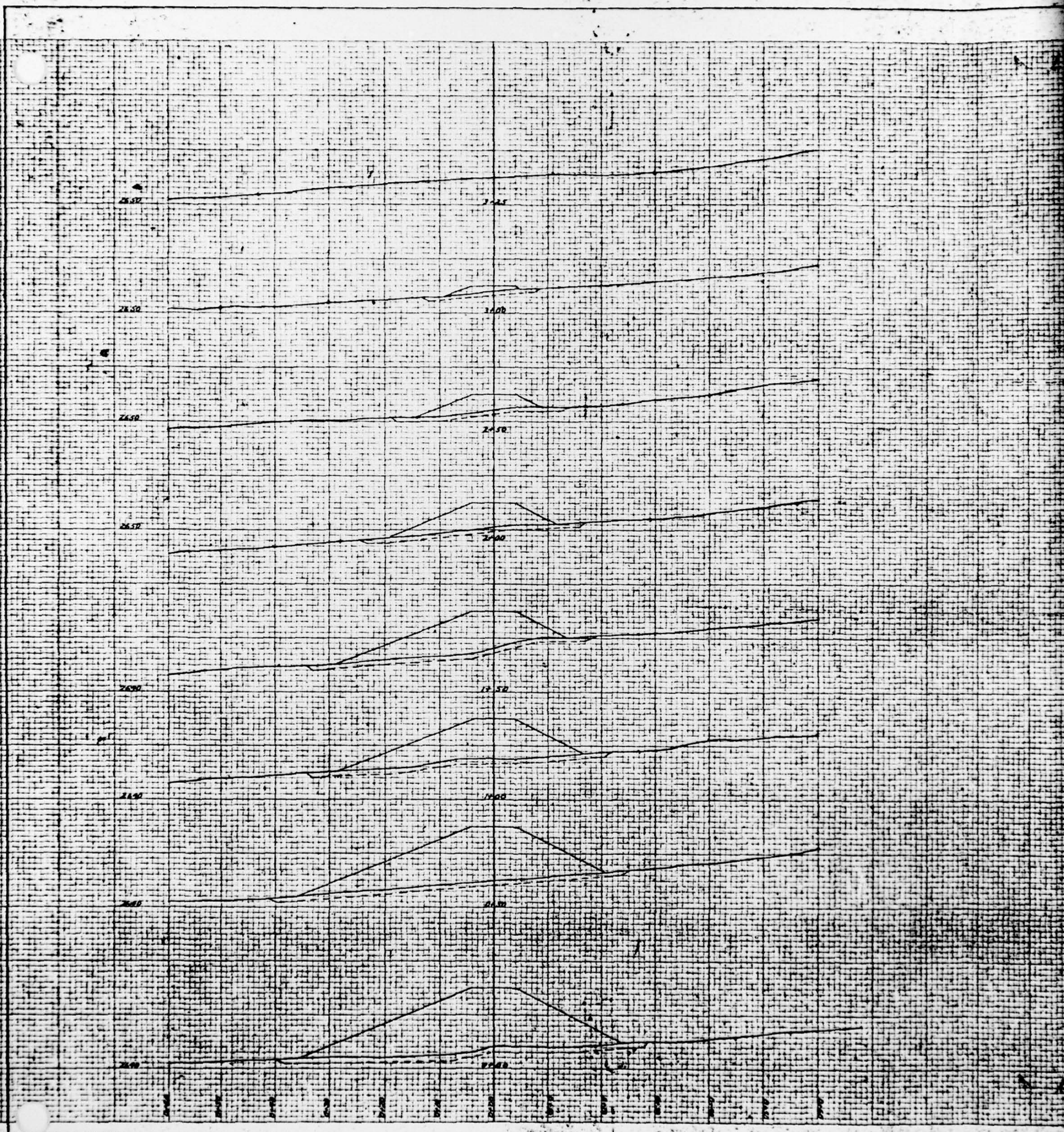
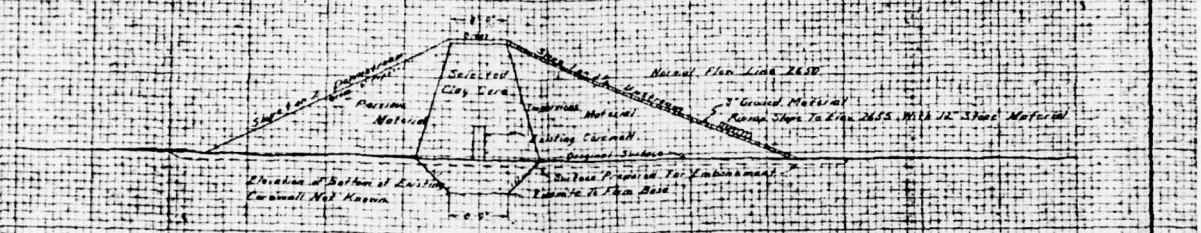

DEER VALLEY DAM
for
WR & GG GETTY & JM HOSTETLER
ELK LICK Twp., Somerset Co., Penna.
SECTION OF EAST EMBANKMENT
THE NEILAN ENGINEERS
Somerset, Penna.
Drawn by - R.P.L.
Checked by - E.G.N.
" " - R.N.L.
Scale: 1" = 10'
July 22, 1930
Sheet 2 of 9
Existing Ground Line
CHARLES BRUNING COMPANY
CROSS SECTION 10 x 10

FIGURE 3



CHARLES BRUNING COMPANY
CROSS SECTION 10 x 10

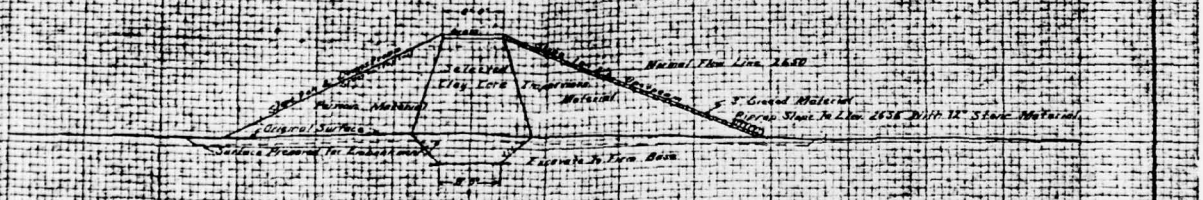
CHARLES BRUNING COMPANY
CROSS SECTION 10 x 10



TYPICAL SECTION OF EAST EMBANKMENT

NOTE:

Fill to be placed in 6" layers - No lumps above size 4" Roll with 3 ton smooth steel roller loaded to at least 300 lb. per square inch and six passes.



TYPICAL SECTION OF SOUTH EMBANKMENT

DEER VALLEY DAM

for

W.R. & O.G. GETTY & J.M. HOSTETLER

ELK LICK TWP., Somerset Co., Penna.

SECTION OF SOUTH EMBANKMENT

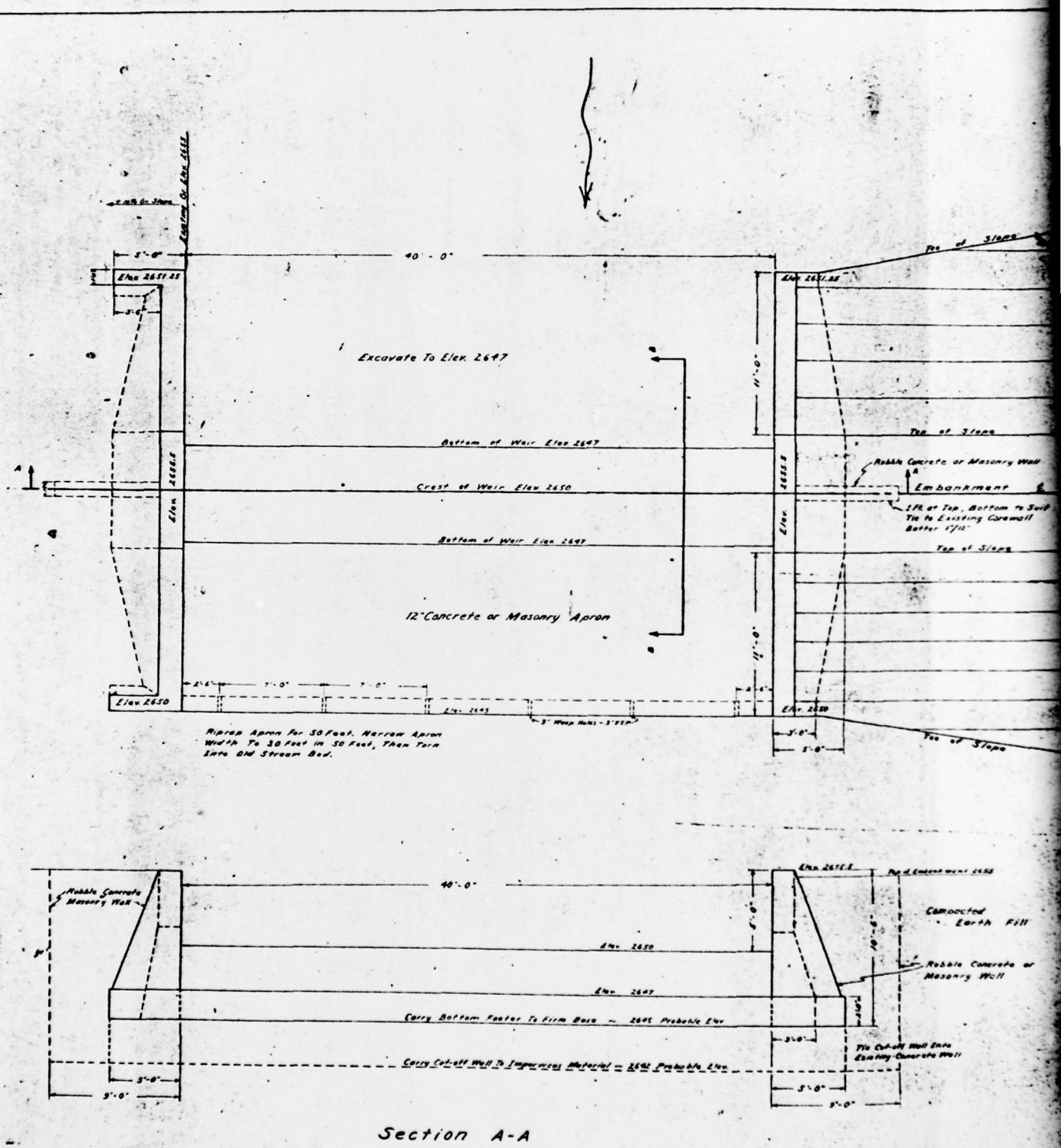
THE NEILAN ENGINEERS

Somerset, Pa.

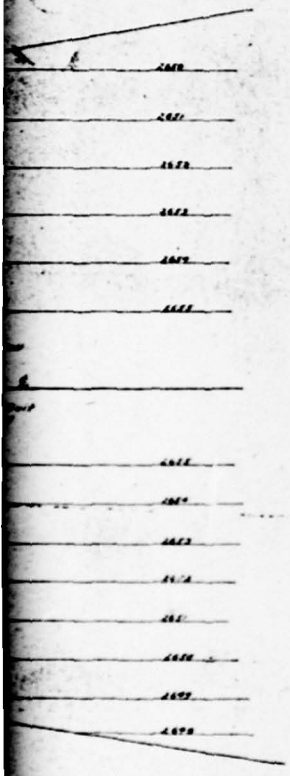
Drawn by - R.P.L.
Checked by - F.G.N.
R.P.E.

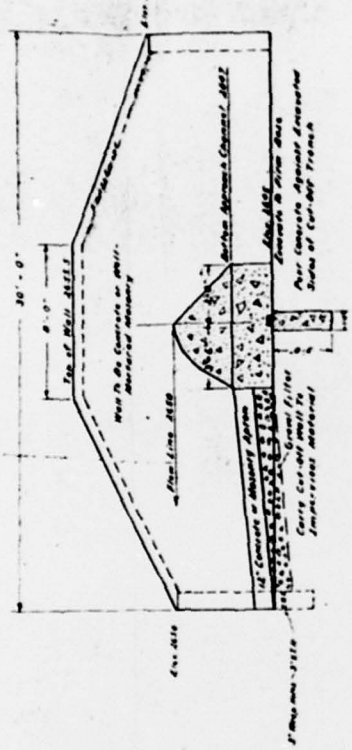
Scale 1" = 10'
July 20, 1955
Sheet 3 of 3 Sheets

FIGURE 4


Excavate To Elev. 2647
40'-0"
Bottom of Weir Elev 2647
Crest of Weir Elev 2650
Bottom of Weir Elev 2647
12" Concrete or Masonry Apron
Rubble Concrete or Masonry Wall
Embankment
Top of Slope
Elev 2650
Elev 2647
Riprap Apron For 30 Feet, Narrow Apron Width To 30 Feet in 30 Feet, Then Turn Into Old Stream Bed.
Rubble Concrete Masonry Wall
Compacted Earth Fill
Carry Bottom Footer To Firm Base ~ 2645 Probable Elev
Carry Cut-off Wall To Impervious Material ~ 2642 Probable Elev
Tie Cut-off Wall Into Existing Concrete Wall

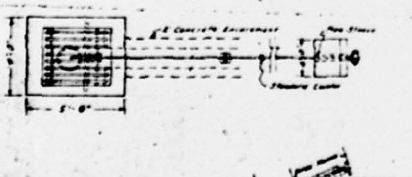
Section A-A

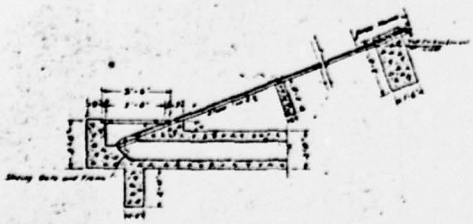




Cross Section of Spillway

Section A-A





Outlet Detail

DEER VALLEY DAM

For

W.R. + O.G. GETTY + J.M. HOSTETLER

Elk Lick Twp., Somerset Co., Penna.

DETAILS

THE NEILAN ENGINEERS

Somerset, Penna.

Drawn by - R.P.L.

Checked by - F.G.N. R.P.L.

Scale: 1/4"=1'-0"

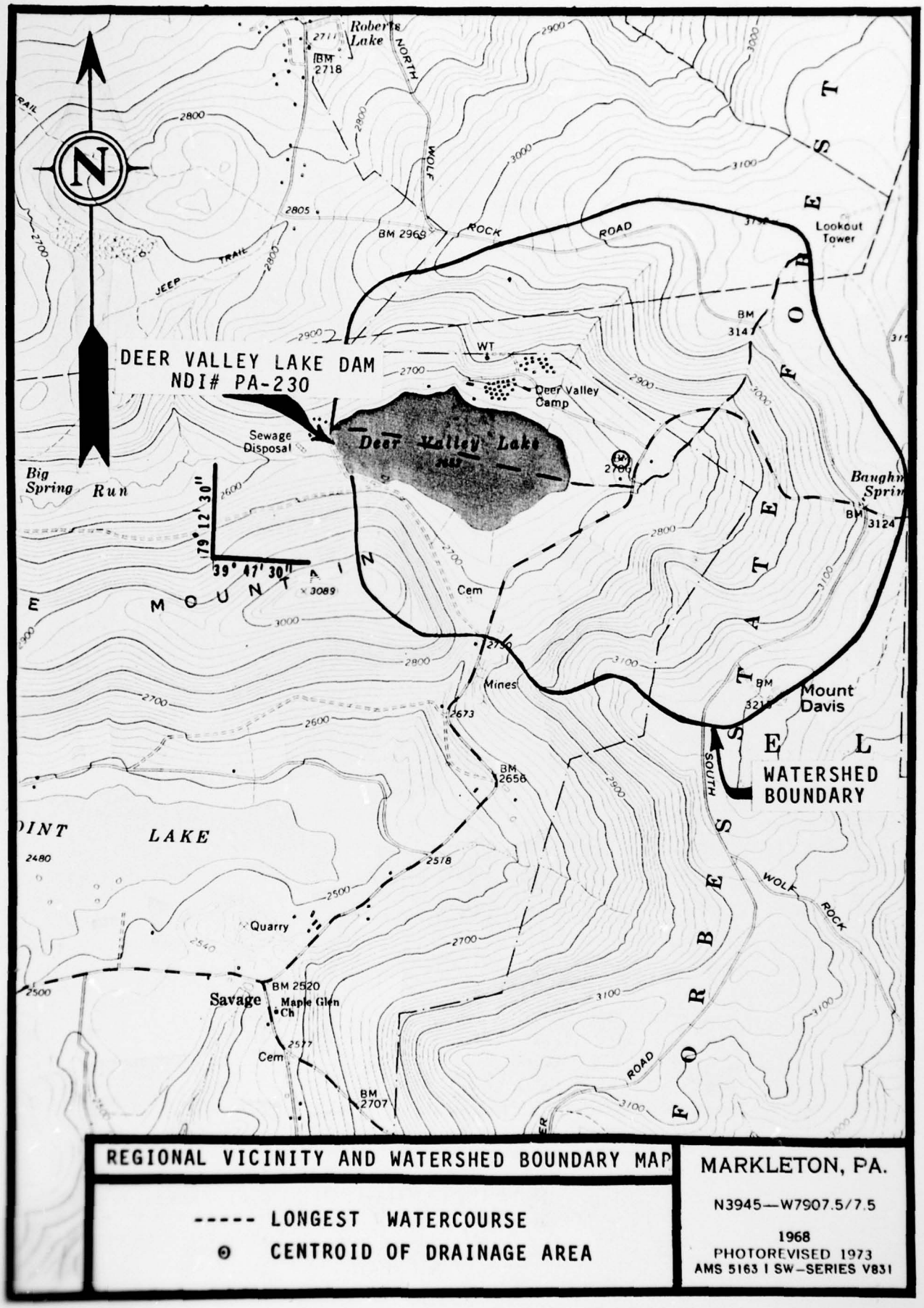
July 29, 1938

Sheet 4 of 4

FIGURE 5

APPENDIX G

REGIONAL VICINITY AND WATERSHED BOUNDARY MAP



REGIONAL VICINITY AND WATERSHED BOUNDARY MAP

----- LONGEST WATERCOURSE

⊙ CENTROID OF DRAINAGE AREA

MARKLETON, PA.

N3945—W7907.5/7.5

1968

PHOTOREVISED 1973

AMS 5163 I SW—SERIES V831